



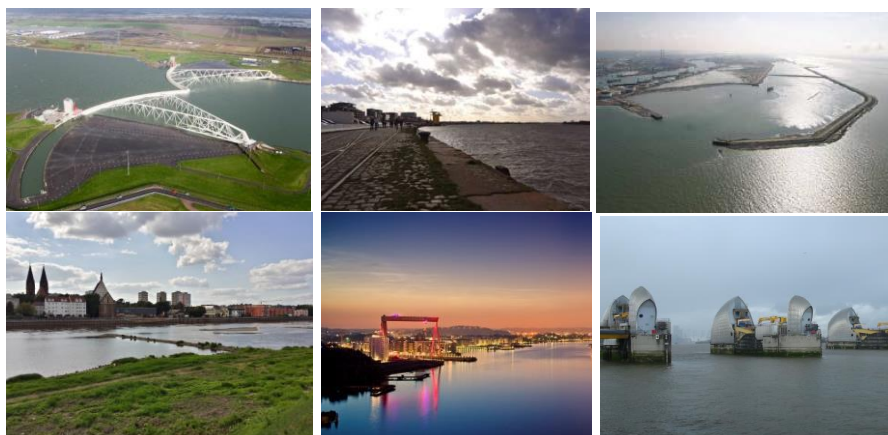
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Comparing flood risk governance in six European countries: strategies, arrangements and institutional dynamics

Matczak, P., Wiering M., Lewandowski J., Schellenberger, T., Trémorin J.-B., Crabbé, A., Ganzevoort, W., Kaufmann, M., Larrue, C., Liefferink, D., and Mees, H.

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Preface

This report is a deliverable of Work Package 4 of the EU 7th Framework Project STAR-FLOOD (www.starflood.eu). STAR-FLOOD focuses on flood risk governance. The project investigates strategies for dealing with flood risks in 18 vulnerable urban regions in six European countries: Belgium, England (UK), France, The Netherlands, Poland and Sweden. The project assesses Flood Risk Governance Arrangements from a combined public administration and legal perspective, with the aim of identifying means of strengthening or redesigning flood risk governance to better support goals of enhancing societal resilience to flooding.

Work Package 1 provided an extended problem analysis related to Flood Risk Governance in Europe and Work Package 2 focused on how Flood Risk Governance in Europe can be researched. Work Package 3 forms the empirical core of the project, in which analysis, explanations and evaluations of each country, including three case studies, have been performed. Building upon this, WP 4 provides a systematic comparison between the STAR-FLOOD consortium countries and informs the research conducted in Work Package 5, leading to the identification of design principles for enhancing flood resilience through processes that are seen as efficient and legitimate.

We trust that the current report is of interest to a broad readership with an interest in Flood Risk Management and governance. The content of this report may inspire researchers and professionals with an interest in social scientific and legal research into Flood Risk Management, Disaster Risk Reduction or climate change adaptation.

Yours sincerely,

Dr. Piotr Matczak
Leader of WP4

Prof. Peter Driessen
STAR-FLOOD Project Coordinator

Overview of key findings

The EU 7th Framework project STAR-FLOOD has diversification of Flood Risk Management Strategies (FRMSs) as one of its core research topics. One of the project's core assumptions is that diversification of these strategies enhances the flood resilience of countries and regions: 'Urban agglomerations, urban areas and regions vulnerable to flooding will be more resilient, if multiple Flood Risk Management Strategies are implemented simultaneously and are aligned'. This assumption reflects debates in research and in practice, as well as European policies such as the Floods Directive (Directive 2007/60/EC) and the UNISDR Hyogo framework. We have distinguished five core strategies related to these policies. A second assumption of the project was that not all strategies (and related arrangements) are feasible everywhere: the idea was that 'the broadening of FRMSs can only be done if these strategies and their coordination and alignment are properly institutionally embedded, given the opportunities and constraints of the physical and social context'. We labelled this with the term 'appropriateness', further operationalised into efficiency and legitimacy. Appropriateness is thought to explain the variety of policy choices in different countries.

To investigate whether, to what extent and how diversification of FRMSs is coming about and to be able to evaluate its contribution to the desired outcomes of resilience, efficiency and legitimacy, a comparative explanatory study is needed. This is the scope of the current report. In this report we investigated the scope of diversity and dominance of flood risk management strategies and the governance arrangements that made these strategies possible, as well as the core explanations for the presence of these strategies and arrangements, including the countries' response to certain challenges, including climate change, urbanisation and Europeanisation. Below, the key results of the analysis are presented, in accordance with the chapters of the report. Firstly, the key messages concerning the comparison of *Flood Risk Management Strategies* and *bridging mechanisms* between strategies are shown. Secondly, the key results of the comparison of the *flood risk governance arrangements* (FRGAs) are presented. Thirdly, the *explanations* of the current state and the dynamics of the arrangements are given. The explanatory part involves the conceptual model used throughout the project comprising four main factors: 1) core country characteristics (*e.g.* physical circumstances of a country), determining the 'room for manoeuvre' in a country; 2) driving forces, which can create windows of opportunity but could just as well create fortification of the status quo; 3) stabilising factors within the FRGAs, *e.g.* path dependency and 4) change factors, such as policy entrepreneurs or counter-alliances. The significance of these factors will be further elaborated upon in other chapters of this report.

1. Comparison of the degree of implementation of Flood Risk Management Strategies

In all analysed countries all the flood risks management strategies (flood risk prevention; flood defence; flood mitigation; flood preparation; and flood recovery) are present but the need for diversification of strategies is evident in all countries except England, where strategies are already diversified. Connections and coordination between strategies were shown to be of crucial importance (see next key finding).

In practice, the implementation of Flood Risk Management Strategies in all countries is lagging behind changing discourses. At the discursive level, the importance of diversification is more and more emphasised. Practical implementation is often hampered, for instance by path dependencies,

as the subsequent chapters will show with more detailed examples. Also, capacities to realise implementation of strategies were found to be lacking.

A distinction should be made between (i) countries where diversification is the main approach towards Flood Risk Management like in England. Here, equal importance is attached to all strategies, and the choice for strategies is strategically informed by considerations regarding acceptable levels of risk and the types of flood hazard (*e.g.* fluvial, coastal) versus (ii) countries in which diversification is seen as the adding of backup strategies to a dominant strategy (*e.g.* Belgium, France, the Netherlands and Poland).

2. Comparison of bridging mechanisms between flood risk management strategies

Diversification of FRM strategies may lead to fragmentation between actors, levels and sectors. While such fragmentation does not need to be problematic, it may be if it leads to inefficiencies, trade-offs between strategies or underinvestment in several strategies. To counteract this fragmentation, all countries have applied and are applying so-called bridging mechanisms between strategies. Bridging mechanisms are conceptualised as policy instruments or related procedures that facilitate integration between strategies and/or flood risk governance arrangements.

There is a variety of bridging mechanisms between strategies in the analysed countries. In most cases, these bridging mechanisms link prevention, defence and mitigation strategies. Some of the mechanisms that are dedicated to overcoming fragmentation of strategies bridge particular pairs of strategies (*e.g.* prevention and mitigation or preparation and recovery) while other instruments address the problem of fragmentation by bridging more than two strategies (*e.g.* multi-layered Safety in the Netherlands, water assessment in Belgium or MAPAM Act in France). Chapter 3 further details the types of bridging mechanisms found and the precise way in which they work.

We found differences in the number of dimensions of the PAA that the identified bridging mechanisms took into account. Some bridging mechanisms focused only on actors or rules while other instruments are more comprehensive. Although this does not lead directly to the conclusion that ‘the more dimensions of governance involved, the better’ some examples of bridging mechanisms support this argument (*e.g.* Delta Programme in the Netherlands). Finally, in England and Sweden we also found bridging mechanisms within particular strategies. Hence, the absence of bridges between strategies does not preclude the absence of formal cooperation mechanisms within the arrangement.

3. Comparison of flood risk governance arrangements

Flood Risk Management Strategies in all countries are embedded in overall flood risk governance arrangements. These consist of the actors and actor constellations involved in all policy domains related to flood risk management – including water management, spatial planning and disaster management – their formal and informal rules of the game, their policy discourses and the power and resource base of the actors involved. Cross-country analysis reveals a number of similarities as well as differences in the structure of national flood risk governance arrangements in the STAR-FLOOD countries. Whereas some countries display a multitude of sub-arrangements (*e.g.* England, France), others are characterised by fewer and larger sub-FRGAs (Netherlands, Belgium and Poland). Concerning how strategies are embedded within the national arrangement, some strategies are governed within one distinct sub-arrangement, others overlap multiple sub-arrangements. This can

be expected to have an effect on how different countries react to external influences and how flexible they are in deliberately changing FRM approaches.

After having compared first the overall governance structure of STAR-FLOOD countries (*i.e.* the flood risk governance arrangements), and then the internal aspects of each national flood risk governance arrangements (*i.e.* the sub-arrangements), we can draw three models that highlight the differences and similarities between countries:

- First, England, Belgium, and Sweden to some extent have significant similarities. Sub-arrangements are highly balanced in the sense that they do not differ significantly in terms of their power basis. This seems to have facilitated diversification of flood risk management strategies but also necessitated the involvement of effective linkage between strategies to avoid fragmentation.
- Second, the Netherlands can be seen as unique because the sub-arrangements are very unbalanced in the sense that there are less sub-arrangements and that the sub-arrangement related to the flood defence strategy – the water management sub-arrangement – clearly has a much larger power basis than all the other sub-arrangements. This sub-arrangement favours public actors. The dominance of this sub-arrangement also leads to a rather independent flood risk management policy. However, the water system management sub-arrangement, as already explained, by its size and importance has the power to promote diversification of strategies on its own. Although it is still the defence strategy that is predominant, preparation and prevention are also mobilised within the sub-arrangement. We found that the dominant sub-arrangement is currently opening itself to other strategies than defence in order to keep its legitimacy and therefore, its overpowering position, less so being challenged by other sub-arrangements.
- Third, France and Poland differ from the two constellations presented above because sub-arrangements there are neither completely unbalanced nor completely balanced. The dominating sub-arrangements of water system management in the Flanders and Walloon regions in Belgium and the defence arrangement in France lead to a rather narrow scope of actors involved and to an independent flood risk management policy. In these cases, the number of bridging mechanism seems to be quite low or ineffective. Although some linkage exists between strategies, the system cannot be defined as highly integrative.

The three models mentioned above lead to an important conclusion in terms of multi-sector governance. It appears that in all cases bridging mechanisms are crucial, however, the reason why differs. In case of an unbalanced FRGA with a dominant sub-FRGA, it needs to open itself to other sub-FRGAs to maintain legitimacy. In case of a more balanced FRGA like in England, bridging mechanisms are needed to overcome inefficiencies and trade-offs between the large numbers of sub-FRGAs.

Paradoxically, strong features of some sub-arrangements can indirectly cause weaknesses in other sub-arrangements. A strong involvement of government can lead to a reduced involvement of other parties (business and citizens) and reduced risk awareness. Also, a strong recovery system with a well-developed insurance scheme can lead to reduced societal preparation and increased risk taking (moral hazard), etc.

4. Explanation of stability and change in flood risk governance arrangements and the related strategies

To explain stability and change in flood risk governance arrangements, we developed a conceptual model that includes four elements: (1) core country characteristics, (2) driving forces (land use changes, climate change impacts etc.) which can create windows of opportunity but could just as well create fortification of the status quo; (3) stabilising factors within the FRGAs, *e.g.* path dependency loops and (4) change factors, such as policy entrepreneurs or counter-alliances. We found that in order to arrive at explanations with sufficient depth and nuance, factors related to all four elements should be considered.

Change hardly ever happens with only one driving force or one change agent, but will very often be a combination of ‘the room for manoeuvre’ regarding country characteristics (*e.g.* level and type of flood risk, scope of institutional reforms), driving forces (concerning sustainability, integrated water management, Water Framework Directive and Floods Directive), absence or weakness of stabilising forces, and strength of change agents. In other words, different elements of the conceptual model can support each other. More formalised driving forces like EU legislation (‘rules’) can support more discursive driving forces (‘discourses’).

Sometimes the overall vulnerability of a country (low lying delta) together with the nature of flood problems (pluvial, fluvial, coastal, heavy rains, etc.) explain governance responses, but very often typical core characteristics of governance in a country ‘override’ potential other approaches to flood risks. Therefore we see a variety of risk approaches and governance choices.

Our analysis revealed that global trends (*e.g.* Europeanization, ecological turn) have different effects in the STAR-FLOOD countries because of different sub-arrangements and different country characteristics. With regards to WP5 (evaluation and policy recommendations), this also implies that adopting recommendations might be constrained in some cases because of these stabilising factors.

Both a stable arrangement like in The Netherlands and a more dynamic arrangement like in England, have their advantages and disadvantages. Within a stable system the chosen management approach has time to mature and to develop, therefore becoming, ideally, more effective and efficient over time. A stable system mostly implies the choice for a limited number of management approaches, which are improved and adjusted over time; but it also implies in most cases a choice against other management approaches (besides England), which are consequently only marginally developed. Due to the path dependency of the existing approach, the capacity to change the arrangement – when facing new challenges – might be limited. Especially in the context of increased uncertainty, *e.g.* due to climate change, this decreased capacity to change might become a disadvantage.

Focusing on driving forces, technical improvements in flood risk management can be seen as a necessary condition: had there been no improvements in mapping and modelling risks, implementing current spatial planning and insurance systems would be a lot more complicated, even impossible. However, that does not mean that all countries use technical improvements in the same manner.

As we have recalled, the hypothesis of STAR-FLOOD is that both a *diversification* of strategies and its *appropriate institutional embeddedness* in terms of efficiency and legitimacy increases resilience to flood risk. We can now add to these conditions the need to be supplemented by bridging mechanisms and serious implementation. We think that it is absolutely crucial to know the factors influencing the *ability of a country to change and to diversify, or to stabilise an appropriate arrangement*. We have analysed those factors in this report. Social and institutional factors often

form strong barriers to the successful implementation of new flood risk management strategies. A governance perspective is required to gain insight into path dependencies and change agents within flood risk management.

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List of abbreviations

ABI	Association of British Insurers
CAT-NAT	Natural Disaster Scheme
CWATUP	Spatial planning Code
EU	European Union
FD	Floods Directive
FRGA	Flood risk governance arrangement
FRM	Flood risk management
FRMS	Flood risk management strategies
FRS	Flood risk strategy
MLS	Multi-layered safety
PAA	Policy Arrangement Approach
PAPI	Action Programmes for Flood Prevention
PSR	Rapid Submersion Plan
SUDS	Sustainable Urban Drainage System
WFD	Water Framework Directive

1. Introduction

1.1 Challenges for flood risk governance in Europe

Over the last decades, floods in Europe caused significant and growing economic losses (Barredo 2009) and casualties, although the scale of losses and casualties varies between countries. There are many floods that have caused tremendous losses. For instance, the losses of the 2002 flood in Central Europe are estimated to have caused a loss of approximately US\$27 Billion. Several other floods in Europe brought losses counted in billions USD (Choryński *et al.*, 2012; Prudhomme *et al.*, 2012; Green *et al.* 2013). It is clear that increased vulnerability due to urbanisation and climate change poses a challenge for flood risk management (FRM) in many European countries.

At the EU level, there are important regulations that are directly or indirectly relevant for FRM. The Water Framework Directive (Directive 2000/60/EC) commits European Union Member States to achieving a good qualitative and quantitative status of all surface and ground waters. Although this Directive is mostly focusing on water quality management, it has an impact on FRM as well because it affects issues of governance (*e.g.* river basin management) and the wider ecosystems where water bodies are part of. The Floods Directive (Directive 2007/60/EC) directly deals with flood risks. It prescribes a three step procedure on the assessment and management of flood risks: 1) Preliminary Flood Risk Assessment; 2) Flood Risk Maps and 3) Flood Risk Management Plans (which are to inform policy makers on the flood risk and on the possible measures to be taken). Enhancing societal resilience by developing strategies to prevent, protect and prepare for flooding is called for at both the EU level and the domestic level, however, the approaches of particular countries differ enormously. There is a variety in terms of the preferences for core flood risk management strategies, in the involvement of public and private parties, in the way flood risks are taken up by sector-based organisations or by generic spatial planning, etc. In short, there is a variety of choices in flood risk governance. In this report we will show this variety, both in terms of practical outcomes – the *flood risk management strategies* – as well as in terms of specific instruments, the underlying policies and politics of flood risk governance, which we call *governance arrangements*. We also look at the *dynamics (stability and change) of flood risk governance*, in response to the many societal challenges, including urbanisation and the effects of climate change.

There are several societal and ecological circumstances that challenge flood risk management. Both the EU and domestic policies and legislations stress the need for more environmentally sustainable approaches to FRM. At the same time, flood risk management is triggered to become more resilient, in terms of reducing vulnerabilities and increasing adaptability of Flood Risk Management Strategies and the underlying policies and politics. This may lead to shifts in Flood Risk Management Strategies which are immediately connected to changing roles of relevant policy actors, sectors and levels of governance, and have repercussions for the rules organising the interactions between the actors, the power relations and perhaps also the discourses on Flood Risk Management. Thus, knowledge about the shape and the dynamics – including the possibilities of change – of Flood Risk Management in European countries, and how this knowledge contributes to societal resilience is of utmost importance.

To analyse these issues we have focussed on flood risk management in six European countries: Belgium, UK (England only), France, the Netherlands, Poland and Sweden. These countries represent various types of flood risk governance; they vary in terms of the nature of flood risks (pluvial or

fluvial, for example), the different geographical conditions as well as their administrative and legal governance traditions.

1.2 The focus and the approach of this report

This report is the result of cross-disciplinary research conducted within the EU 7th Framework Project STAR-FLOOD (www.STARFLOOD.eu). The STAR-FLOOD project focuses on flood risk governance and investigates how current Flood Risk Governance Arrangements (FRGAs) can be strengthened or redesigned to enhance societal resilience to flooding. Drawing on public administration and legal disciplines, flood risk governance is examined in the six selected EU Member States. This report draws upon earlier work done within the project: a literature review, the development of a conceptual and evaluation framework (WP2), and, most importantly, six elaborate country studies, with 18 regional cases, carried out within WP3.

A starting assumption of the STAR-FLOOD project is that societal resilience to floods can be increased by *diversifying and linking flood risk management strategies*. Thus we assume that: (a) urban agglomerations, urban areas and regions vulnerable to flooding will be more resilient, if multiple Flood Risk Management Strategies are implemented simultaneously and are aligned; (b) a successful implementation of a diverse and resilient set of FRMSs, requiring a combination of old and new strategies and coordination of different strategies is only possible if these are properly *institutionally embedded* given the opportunities and constraints of their physical and social context and hence are seen as efficient and legitimate. In this report we mainly refer to the assumption (a). While the focus of this report is on explaining stability and change in flood risk governance, another report, of Work Package 5, focuses on evaluations of flood risk governance in terms of resilience, efficiency and legitimacy and identifies policy design principles based on the results of this evaluation.

Therefore, this report starts with the flood risk management strategies. The **first** step is to compare the visible outcomes of flood risk governance, in terms of the *flood risk management strategies* in six countries (chapter 2). In Figure 1.1. these strategies are depicted.



Figure 1.1 The five core flood risk management strategies as distinguished in STAR-FLOOD

This overview of strategies, based on the safety cycle, and sketching flood risk policies from proactive planning to recovery, was introduced as a heuristic device to identify the directions in which flood risk governance was practically elaborated in the six countries under scrutiny. It also provided a pragmatic way of organising the array of FRM measures employed by different EU Member States. This could vary from land use allocation policies as ‘real’ preventative measures (‘keeping people away from water’), to insurance systems, in order to enable people to recover from floods.

A **second** step in the comparison was to see whether *connections* were made linking flood risk management strategies (in chapter 3). This is also referred to as the ‘bridging mechanisms’ between strategies.

A **third** step was to analyse and compare the underlying *flood risk governance arrangements* (chapter 4), earlier described as the ‘policies and politics’ of flood risk governance. We focused at core similarities and differences of governance arrangements in six countries. This is easier said than done, as countries vary enormously in their ‘policy and politics’. Therefore the STAR-FLOOD project eventually distinguished between overall Flood Risk Governance Arrangements (FRGA) and specific sub-arrangements (sub-FRGAs), *e.g.* emergency management as a subdomain of flood risk governance. An (overall) Flood Risk Governance Arrangement (FRGA) encompasses all policy domains directly relevant for the management of flood risks—including relevant parts of water management, spatial planning and disaster management. It deals with the actors and coalitions of actors involved, their dominant discourses, formal and informal rules of the game and their power and resource base (Hegger *et al.* 2013). Simply defined, a FRGA refers to actors, rules, resources and discourses united under the shared goal of Flood Risk Management (FRM). Within this national arrangement, sub-arrangements (referred to here as sub-FRGAs) may operate to achieve a distinct goals related to flood risks (such as spatial planning or flood emergency management). Both units of analysis were examined in depth at the national *and* local scale within the STAR-FLOOD countries. In this report we, however, focus on the national, overall level.

Chapter 5 aims to give *explanations* for both the diversity and dominance of these Flood Risk Management Strategies in the six countries (chapter 2 and 3), and for the dynamics in the underlying governance arrangements (Chapter 4) in terms of *stability and change*. This **fourth** step is quite difficult and ambitious. It will try to make full use of the conceptual model again and will discuss (A) the general country characteristics, and (B) the ‘driving forces’. These driving forces do not change the diversification of Flood Risk Management straightforwardly. Instead, they are mediated by stabilising (C) and changing factors (D) within FRGAs (see Figure 1.2.). There can be internal forces that might lead to *stabilisation* of (sub-) arrangements and their outcomes (strategies), *e.g.* path dependencies and lock-in effects of flood infrastructure, and internal forces that might lead to *change*, *e.g.* policy entrepreneurs that try to alter the set of arrangements and strategies.

The findings of our comparison have implications for understanding how flood risk governance can be improved through the identification of success conditions and design principles. This is elaborated in a complementary report (Deliverable 5.2), focused on evaluation and proposing design principles.

1.3 The conceptual model of the comparison

As was stated before, flood risk governance arrangements differ significantly (Hegger *et al.*, 2013). As well does the composition of flood risk management strategies and their evolution. The scope of both similarities and differences offers insights to governance paths that countries have chosen to support societal resilience to flooding. How and why they differ in their strategies, arrangements and institutional dynamics (policy change and stability) will be explained in the following chapters. Our approach is summarised in a conceptual model which serves as a background for this report (Figure 1.2). It was inspired by a variety of approaches in policy analysis, combining the policy subsystem-inspired advocacy coalitions framework (ACF) of Sabatier and Jenkins Smith (1993) with ideas of historical institutionalism including path dependencies (North, 1994; Pierson, 2000), theories on agenda setting, stressing the role of streams of information and policy entrepreneurs (Kingdon, 1984)

with the policy arrangements approach (Van Tatenhove et al, 2000; Wiering & Arts 2006; Liefferink, 2006). Core in the STAR-FLOOD project was the Policy Arrangements Approach (PAA) which considers a policy arrangement as “a temporary stabilisation of the content and organisation of a policy domain” (Van Tatenhove *et al.* 2000).

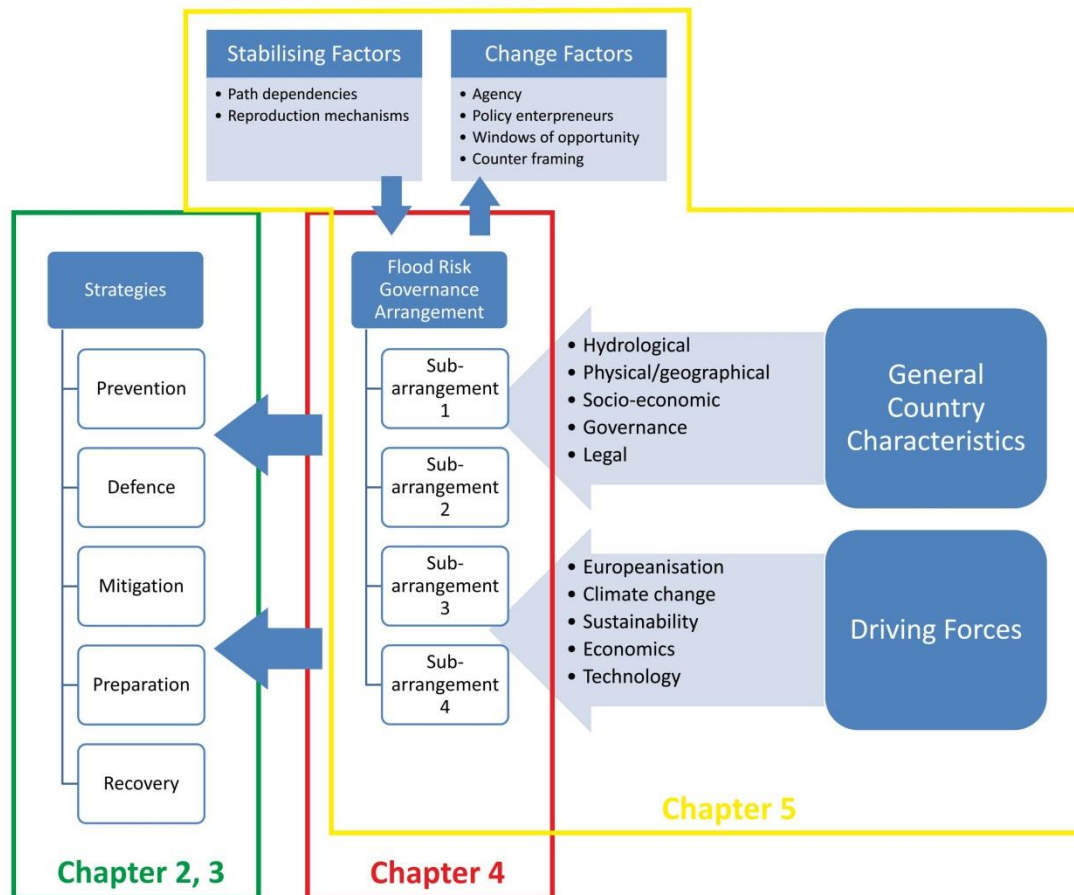


Figure 1.2 Conceptual scheme for comparative analysis within the structure of the project

Figure 1.2. above summarises the main logic of the report. Going from left to right, the figure depicts consecutive chapters: in Chapters 2 and 3 *Flood Risk Management Strategies* and *connections* between the strategies in the six countries are compared. In Chapter 4 *arrangements* are compared, and finally, in chapter 5, we give insight in *explanations* of governance choices including the analysis of the arrangements' *stability and change* (For research questions of each chapter – see Box 1.1 below.).

The directions of arrows in the figure (going from right to left) represent the main line of reasoning. Overall, in the report it is analysed how general characteristics of the countries as well as certain exogenous 'driving forces' can explain stability and change of certain arrangements and – eventually – strategies. Proposed explanatory factors can be exogenous to the arrangements (right) and endogenous to the arrangements (above): country characteristics and driving forces (right side of the model) are exogenous to the governance arrangement(s), stabilising forces and changing forces within the arrangements (top of the model) are important endogenous factors that eventually translate (exogenous) characteristics and driving forces into changes. The six cases provide data for explaining how the arrangements are stabilised and how and why they change and, eventually,

whether this all helps to establish societal resilience to flood risk. In short, we apply both theories of stability and change, and this is further elaborated in chapter 5 of this report.

Box 1.1 Research questions addressed in this report

- Chapter 2: What are the similarities and differences observed in the six countries in terms of Flood Risk Management Strategies? To what extent are the countries' strategies different?
- Chapter 3: To what extent are strategies in countries aligned and with what results? What are the main similarities and differences between countries in terms of strategies' alignment?
- Chapter 4: What are the similarities and differences that can be observed in the six countries in terms of Flood Risk Governance Arrangements? What are the main institutional patterns of Flood Risk Governance Arrangements and to what extent do they differ between countries?
- Chapter 5: What factors are responsible for stability and change in arrangements, and what are mechanisms of stability and change?

As written previously, the empirical part of the STAR-FLOOD project relies on an exhaustive description of the six analysed countries (Alexander *et al.* 2016; Ek *et al.* 2016; Kaufmann *et al.* 2016; Larrue *et al.* 2016; Matczak *et al.* 2016; Mees *et al.* 2016). Next to this stage of writing the country reports, researchers from each partner country were requested to complete a qualitative matrix to centralise the key findings from national and case study evaluations performed in their respective countries. This Excel-based matrix requested researchers to enter information organised in accordance with the conceptual framework of the project (*i.e.* Strategies, FRGAs, FRGAs dynamics, General characteristics, Legal factors, Influence of agency, Influence of events) and the logic of the analysis. More details on the structure of the matrix are presented in Appendix 1. Data collected for, and presented in the six WP3 country reports were used by the national research teams to fill the matrix which eventually became the basic resource for the WP4.1 analysis, complemented by the details of the reports.

Public administration and legal expertise

For the legal dimension of this report, the functional legal comparison method has been applied (Gorle *et al.* 1991; Ancel 1971; Bussani and Mattei 2012). The functional legal comparison method puts forward the function of the law as the unit of comparison (Larrue *et al.* 2013, see also Appendix 2). Various relevant legal components of the six countries' FRM systems were analysed within WP3, including domestic legislation, decentralised legislation, guidance documents, case law and doctrine. The functional comparative approach to legal analysis helps us to understand not only the role of legal documents themselves in their 'legal environment', but also their importance in policies' implementation and development, *e.g.* the role of legal institutionalisation in stability and change of arrangements.

The impact of EU legislation and policy relating to FRM was also considered within the analysis. The comparison of results obtained via legal and policy analyses has been fully integrated into this report. They were regarded as equally important in the pursuit of the project's aim.

1.4 Outline of the report

The overall structure of analysis which was applied in this report was designed in the report of Work Package 2 that provided a conceptual framework and methodology (Larrue *et al.* 2013). It aims at

comparative description of flood risk management strategies and flood risk governance arrangements and at analysing and explaining stability and change therein.

A comparison of the way countries deal with the five *strategies* is presented in chapter 2 of this report. Presence of strategies and their relative importance within countries will be investigated. This is followed by the comparative analysis of *connections* or bridging mechanisms as a second step dealing with strategies (in chapter 3).

In chapter 4 a comparison of *Flood Risk Governance Arrangements* (FRGAs) between the six countries is elaborated. This chapter also identifies dominant characteristics of these FRGAs and elaborates on their implications for diversifying and linking FRMSs.

Chapter 5 gives *explanations for stability and change* of Flood Risk Governance Arrangements in the STAR-FLOOD countries. It provides an overview of how flood risk governance has evolved in the countries and highlights exogenous and endogenous factors that appear to shape change and stability. This chapter summarises previous chapters and provides explanations for the characteristics and dynamics of the FRGAs in the countries.

2. Diversity and dominance of Flood Risk Management Strategies in six European countries

2.1 Introduction

This chapter addresses the question on ***what are the similarities and differences observed in the six countries in terms of Flood Risk Management Strategies? To what extent are the countries' strategies different?*** It therefore examines the degree of implementation of different FRMSs and how they have evolved in each of the STAR-FLOOD countries. We assume that a diversified and balanced set of strategies is necessary for supporting societal resilience to flooding (Priest *et al.*, 2013; Hegger *et al.*, 2014). Therefore this chapter firstly examines to what extent a diversified set of FRM strategies is in place in each country. By dominance we understand a degree of supremacy of one (or more) strategies over others. A dominant strategy is thus conceptualised as a list of measures mostly engaged in in flood risk management and supported by domestic flood policies. Diversification is understood as the extent to which all five strategies can be identified in a particular country. Assessments on both diversification and importance of strategies have been made by researchers after extensive legal and policy analyses supported by in-depth interviews with key informants. Results have been delivered in six country reports. We will start our analysis with investigation of dominance and diversification of strategies (section 2.2). All six STAR-FLOOD countries (*i.e.* Belgium, England, France, the Netherlands, Poland and Sweden) will be presented in alphabetical order. Conclusions will be provided in section 2.3 of this chapter.

2.2 Diversity and dominance of Flood Risk Management Strategies – comparative analysis between six EU countries

In all the countries all flood risk management strategies are evident. This means that each strategy can be identified in each country at least to some extent. One should note that estimations about the degree of importance of strategies require taking into account not only the financial dimension because in financial terms the defence strategy would be most significant. Therefore the assessment made in this section shows how these strategies are embedded in FRM. The degree of importance of each strategy in the countries is summarised in the consecutive figures related to each analysed country. The relative importance of strategies is presented via the intensity of colours. One should bear in mind, however, that the discursive importance of a strategy (*i.e.* the degree of attention given to some measures) is sometimes different from implementation in practice. We address this distinction throughout this section.

2.2.1 Backing-up defence – Belgium

Prior dominance of the flood defence infrastructure in Belgium has been supported by the increased attention to creating space for water. In this sense, Belgium is unique due to the presence of the space for water and the integrated water management concepts (Mees *et al.* 2015). In the past the Belgian FRM was perceived to be exclusively the watercourse managers' responsibility but the flood events in Belgium of 1998 and 2002-03 demonstrated that floods could no longer be prevented by flood defence measures alone. It is exceptional compared to other analysed countries since it has specific links between water quality and water quantity. The diversification of strategies signified in the previous section also resulted also in a more balanced FRM in this country. The process of strategies' diversification is similar in both the Flemish and Walloon Regions. Nowadays, the Flemish and Walloon flood risk management systems has three most notable strategies: defence, prevention

and mitigation, and shows the high importance of recovery and minor importance of preparation. These has been summarized in two subsequent Figures (Figure 2.1 and Figure 2.2).

Figure 2.1 Importance of strategies in the Flemish FRM



Figure 2.2 Importance of strategies in the Walloon FRM



Even though the classical flood defence approach with dykes and embankments still dominates in practice, the hydro-technical infrastructure is being increasingly backed-up by more environmentally-oriented measures (*i.e.* natural flood management). The importance of defence as a strategy has remained rather unchanged throughout the analysed period (1995-2015). Moreover, cost-benefit analyses appear to give preference to local defence measures over other strategies.

Simultaneously, two other strategies: prevention and mitigation benefited from additional instruments (acts, programmes, schemes). Prevention has become the most articulated in discourse in both the Flanders and Walloon regions, and in Flanders it has also been given new regulation (*i.e.* art. 136 Walloon code of spatial planning, urbanization and cultural heritage, CWATUP). Formal cooperation between the policy domains of water managers and spatial planners, such as water assessment or Multi-Layered Safety, has been established. Meanwhile, the awareness of spatial planners for water concerns has improved significantly due to flood events. This has been substantiated by the reform of spatial planning tools which simplified its application. This resulted in both an increase in the importance of prevention but also in bridging these two strategies (see: section 3.1.2).

The mitigation strategy is also significantly important for Belgian FRM. In some cases (*e.g.* Antwerp) mitigation techniques such as rainwater regulations or resilient building are deemed impossible due to physical circumstances. Apart from that, mitigation has undergone important changes, influenced mainly by Flemish regulation and awareness raising. Investments in flood retention zones in the whole of Belgium are also the reason for that. In fact, nowadays pluvial flooding is addressed by some mitigation measures. As a result, this strategy has gained increasing its importance for Belgian FRM.

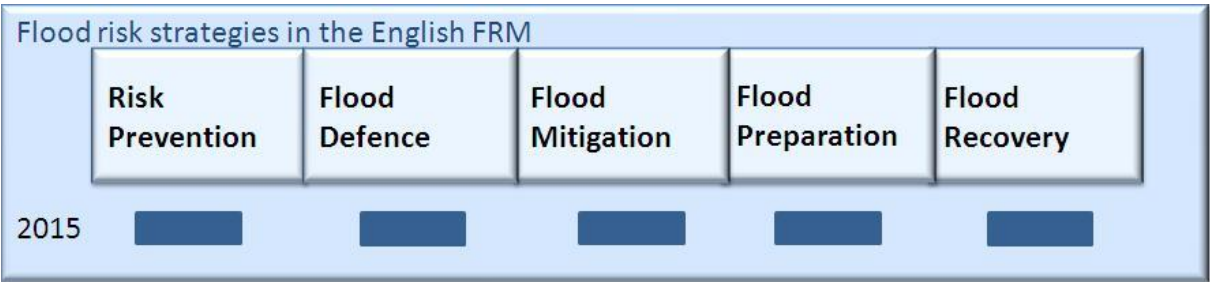
The recovery strategy, even though not so important for FRM, functions quite well in Belgium. Inhabitants of areas impacted by the flood of 2010 declare that they are satisfied with the compensation they received. Processes of regionalisation in Belgium also include aspects of ex-post compensation. The expertise concerning the disaster fund was transferred to the regions. With this transfer, the role of the Flemish Region and the Walloon Region in the recovery strategy has increased (since they became responsible for the disaster fund) and it has made it easier to link this strategy to other strategies (since the Flemish Region is also competent in these strategies). In contrast, preparation has remained in a rather stable and insignificant position within Belgian FRM. Although professionalization in this strategy can be noticed, it is not accompanied by the relevant resources.

Summing up, the dominant position of Belgian defence has been effectively assisted by both prevention and mitigation measures. Despite some application problems in practice (*i.e.* Antwerp) these two latter strategies gained significant attention in the period analysed at both national and regional levels. A shift in responsibilities for recovery measures resulted in an increase of importance of the recovery strategy in this country.

2.2.2 Enhancing societal resilience – England

In contrast to other European countries, a diversified and holistic approach to FRM has been established for ca. 65 years in England (Alexander *et al.* 2015). Flood risk governance in England acknowledges that flood prevention through defence networks is not feasible for every at-risk location; rather, social, economic and environmentally sustainable FRM requires a portfolio of structural and non-structural solutions to minimise the adverse, tangible and intangible consequences of flooding. This has resulted in a diverse approach to FRM that is highly institutionalised. In contrast to the other STAR-FLOOD countries, each of the five FRMSs are regarded as equally important in delivering effective FRM (Figure 2.3).

Figure 2.3 Importance of strategies in the English FRM



Although all FRMSs are treated equally today, a crucial point to highlight is that the relative importance assigned to these strategies has shifted over time; in particular, flood defence was arguably more valued through the 1960s to early 1990s. Historically speaking, recovery as a strategy has the longest history, with flooding becoming a standard peril as part of a composite domestic insurance policy in 1922 and total losses available since 1929. In terms of the prevention strategy, since 1947 spatial planners have been able to consider flood risk and development of the floodplain as part of a wider effort to control urban sprawl, albeit this was not explicitly required or nationally consistent at this point in time. With the growing momentum of environmentalism, environmentally sustainable approaches to FRM have arguably grown in importance, such as measures for Natural Flood Management (Defra/EA, 2014b). Related to this, the summer floods in 2007 and subsequent Pitt review (Pitt, 2008) highlighted the need to develop measures for managing surface water. As

part of the National Planning Policy Framework (as amended) developers must now include provisions for Sustainable Urban Drainage Solutions for developments involving 10 or more properties. Moreover, homeowners are increasingly encouraged to implement property-level measures. In addition to strengthening flood mitigation, significant efforts have been made to enhance citizen involvement within the strategy of prevention and response. Community flood action groups, community flood action plans and voluntary flood wardens are becoming commonplace in at-risk communities. Whilst certain measures within particular strategies seem to be receiving more attention, this reflects efforts to maximise the effectiveness of these strategies.

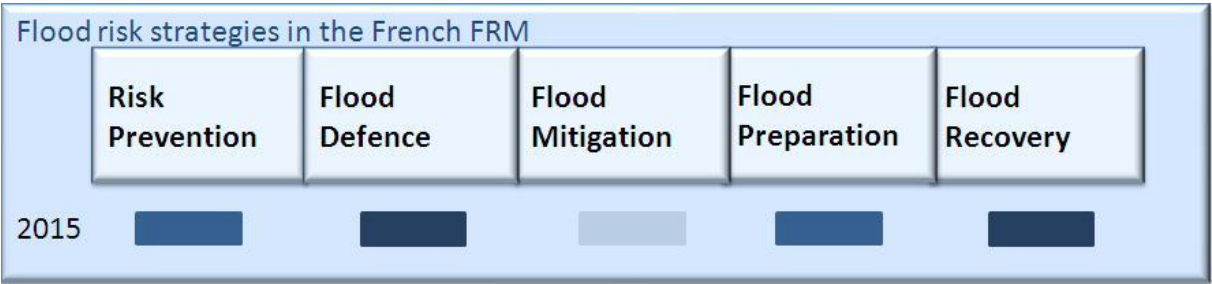
English diversification of strategies does not constitute an attempt to create ‘back-ups’ and contingencies should flood defence fail; rather it symbolises a long-established approach to FRM which accepts that floods cannot be prevented at all times. This is embedded in the legislation and evident in the fact that there is no statutory right to flood protection in England, which reflects a normative perception of floods as ‘acts of God’ (Scrase and Sheate, 2005). This may explain why a diversified approach has emerged in England. Ultimately, all strategies are deemed equally important in policy and practice.

2.2.3 From state policy to local strategies – France

French FRM has four main strategies, namely: prevention, defence, preparation and recovery. Defence and preparation are the core of the historical flood policy in this country, with the dominant position of the structural approach towards FRM (Figure 2.4).. This is partially due to the importance and age of laws which date from the 18th and 19th centuries. By these laws, the State affirmed its security-oriented concept of risk management, and retains a powerful influence on flood policies today. In fact, the pertaining and central role of the State is unique for French FRM (Larrue *et al.* 2015).

Even though responsibilities for infrastructure belong to landowners, the State's interventionist approach and the faith of the civil society in the public sector are essentials pillars of the historical defence dominance. However, the “French political model” has been changing recently. First, the State is starting to unburden itself of the defence strategy for financial reasons and is increasingly giving competences to the local authorities, which are not eager to invest in defence infrastructures because of budget shortages. Moreover, the civil society is increasingly challenging the State’s authority in terms of public investments in protection measures based on environmental issues. Overall, the defence strategy remains a very important strategy compared to the others strategies in the French case, due to the inheritance of the past. Furthermore, the strategy has been stable in importance over the last 35 years: public authorities are quite reluctant to build new dikes, and most of the strategy consists of maintaining the already existing infrastructure network.

Figure 2.4 Importance of strategies in the French FRM



Regarding the recovery strategy, the solidarity principle and the Natural Disaster Scheme (*i.e.* CAT-NAT) adopted in 1982 makes the French FRM strongly orientated towards the recovery strategy. CAT-NAT remains within the domain of the State and relies operationally on insurance companies and insured clients as the main (compulsory) contributors. In terms of comparative importance, the recovery strategy is financially very prevalent as it represents a major yearly investment (approximately the same amount of money as for the defence infrastructure). Nevertheless since the adoption of the CAT-NAT regime, it has not evolved much in terms of relative importance. Preparation is also an important strategy for French FRM. It is a multi-risk, not simply flood-oriented strategy, and is also traditionally the State domain. Involvement of citizens as actors responsible for their own safety has caused some dynamics in the preparation strategy at the local level (*e.g.* Le Havre, Nice). However, at the national level, its importance remained quite stable in the period analysed.

Since the end of the 1980s prevention has gained in importance. Risk planning stands as the cornerstone of prevention. Rigorous restrictions on construction in risk areas are imposed on local authorities by the State through the use of public easements. Municipalities are responsible for land planning and issuing building permits, and tensions between them and the State represent an important challenge for public authorities. Consequently, local authorities began to seek additional responsibility in order to meet restrictions imposed by the State. They are the main actors in reducing the vulnerability of buildings and flood retention techniques. Since 2005, the funding of vulnerability reduction measures by the Barnier Fund supports ecological continuity in flood control areas. Moreover, SUDs are gaining increasing importance in urban projects. Altogether, these have resulted in some visible attention begin paid to mitigation measures at national level. Thus, even though the significance of the mitigation strategy is not so great for French FRM, its importance has grown in the period analysed.

Summing up, the diversification of strategies is evident in France. In fact, the reconfiguration of the strategies under the banner of “prevention” is remarkable for this country. Defence and preparation remain the historical competence of public institutions in France. Recovery is very typical of the French system and although it is a quite static strategy it remains one of the most important strategies of the French FRM. Prevention is also a key strategy in its overall role and the growing dominant discourse over all flood risk management actors, while mitigation represent by far the less important strategy. Regarding the dynamics in French FRM, two strategies have gained importance since the beginning of the 1980s, namely: prevention and mitigation.

2.2.4 Drowning in safety? – The Netherlands

The predominance of the defence strategy, with probability-reducing measures, such as the construction and maintenance of dikes, storm surge barriers and water storage locations, is also the main characteristic of Dutch FRM (Figure 2.5). Despite the physical circumstances, the high level of institutionalisation and the great efficiency of structural measures (see: chapter 4), this country case study has begun to exhibit a broader portfolio of measures (Kaufmann *et al.* 2015). The flood defence strategy is at the core of Dutch FRM, but since 2001 prevention has gained importance with the ‘beleidslijn grote rivieren’ (policy guideline used by water authorities and spatial planners when granting licenses for building in flood-prone areas and the winter bed of rivers). It should be mentioned, however, that the ‘new’ Dutch risk-based approach is still developing and not yet legally implemented in relevant legislation.

Figure 2.5 Importance of strategies in the Dutch FRM

Diversification of strategies is also evident in the Netherlands, since all are present in this country to some extent. The binding force of documents implemented, introduced into Dutch FRM (*i.e.* the so-called ‘water test’ (*watertoets*) or ‘water assessment’) strengthened the prevention strategy. Mitigation also gained attention. A step further in the development of other strategies was the introduction of a ‘risk-based approach’ in FRM policy and consequently the introduction of the Multi-Layered Safety (MLS) policy concept in 2009. However, this approach is a pilot project.

Taskforce Management Flooding established by the Dutch national government in 2006, to improve the organisational crisis response for flooding, put more focus on the strategy of preparation. Changes in the importance for FRM can also be noted for the mitigation strategy. This is institutionalised as it is a formal legal duty of municipalities and citizens together, and practice shows many regional experiments and developments in urban water management. The mitigation strategy also began to be implemented through spatial planning measures. Even though the scale of this process is still small, the adoption of specific building criteria or restrictions in building codes accompanying zoning plans has raised the importance of prevention within Dutch FRM. The Water Test, used since 2001, requires spatial planners to ask the advice of the water authorities on the effects of new developments on water management, thus enabling water authorities to play some role in Dutch spatial planning, although there is no obligation to comply with the advice given. In the near future the legal obligation to implement the water test will be relaxed and reduced to a general obligation of authorities to work together in environmental policies. In fact, authorities have already started to play a formalised advisory role during the process of drafting strategic and normative spatial policies.

On one hand, the importance of defence as a strategy has remained rather unchanged within the period analysed. Projects such as Room for the River refer to a discourse present within the defence strategy for around 20 years. However, its impact on defence practice is not significant. On the other hand, over the last 20 years other strategies have become more popular, even though they are mostly applied in exceptional cases where the flood defence approach is not efficient or feasible. The concept of Multi-layered Safety used existing instruments to develop prevention, mitigation and preparation strategies. By the virtue of the Water Test, the importance of prevention has also been raised. A small change in significance has been made in the recovery strategy, mainly due to increased involvement of the private sector. Summing up, all strategies have been raised in importance for Dutch FRM, and taken as a whole, FRM in this country has begun to be more balanced in terms of the importance of strategies than it was 20-30 years ago.

Although some developments confirm flood defence as the primary strategy, prevention/mitigation and preparation are explicitly presented as supplementary strategies in Dutch FRM.

Institutionalisation of emergency funds from the state made it possible to also include recovery as a strategy which cannot be considered to be broadly implemented.

2.2.5 Looking for strategic planning – Poland

The Polish case can also be characterised as dominated by one strategy (Matczak *et al.* 2015). Polish FRM is dominated by defence measures. In terms of dominance, the Polish case exhibits similarities with the French and Dutch ones. This dominance is a consequence of the long-lasting prevalence of a technical-infrastructure approach towards FRM. Typically, embankments, dikes, dams and reservoir, are the most prevalent measures within Polish FRM (Figure 2.6). Since investments in such measures absorb huge financial resources, they can only be afforded by central institutions. The national budget for investments is radically higher than at the local level. Therefore, municipalities are usually not involved in such investments. In this way, centralisation of the defence strategy has remained rather unchanged in the period analysed (since the fall of the communist system in 1989/1990).

Figure 2.6 Importance of strategies in the Polish FRM



Diversification in Poland has started recently, in the last 20 years. Defence has the longest tradition within Polish FRM. Since the 2000s, the dominant approach towards FRM has been criticised by pro-environmental groups as: a) ineffective in terms of flood management and b) as harmful for the environment. Nevertheless, the effects of recent dramatic experiences have triggered actions not only to support defence measures but also those of crisis management. The importance of the defence strategy has been raised, but preparation has significantly changed in importance, becoming the second important strategy for Polish FRM. In contrast to defence, preparation measures are implemented in a decentralised way. This strategy in Poland relies on the provincial, county and municipality levels (three administrative levels in Poland), and operational capacities belong mostly to the State Fire Brigades. Although at the lowest, municipal, level, it is not obligatory, the crisis management teams are usually set up and are responsible for planning, communication and coordination.

Three other strategies, namely prevention, mitigation and recovery, remain rather insignificant for Polish FRM, compared to defence and preparation. Most important of these is the prevention strategy but it is generally weak, due to the feeble development and implementation gap of spatial planning. Economic development is a dominant priority for local governments and this leads to investments in flood-prone areas. Implementation of FD with its Flood Hazard and Flood Damage Maps which have to be incorporated into local spatial and development plans have given visibility to preventive measures but this has not greatly changed the importance of the strategy. The recovery strategy also exhibits little importance for Polish FRM. Although there are mechanisms (*e.g.* a budget reserve to be kept by municipalities) devoted to flood recovery, they hardly constitute a coherent system. Instead, big floods involve ad hoc decisions to tackle a problem. Even though the penetration of insurance markets has increased with the growth of the mortgage market, the importance of

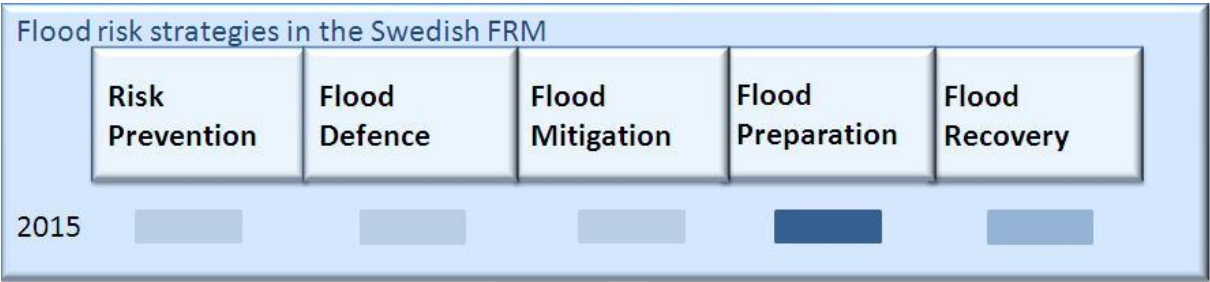
recovery has still not changed significantly. However, some minor dynamics have been observed in the importance of the mitigation strategy. Even though inconsistent, green urban areas are being created more and more often in Poland. These measures are taken more for aesthetic and recreational rather than for water storage purposes but are beginning to occur. Moreover, the State Forest Holding is creating nationwide small water retention programmes nationwide, which have changed the importance of the mitigation strategy to a minor extent.

Summing up, Polish FRM is dominated by the defence strategy with a supportive role for preparation. These two increased in significance since preparation gained momentum in the frame analysed. There has also been a slight increase in significance of the mitigation strategy, even though still not important. Despite attention being given to prevention in Poland, the importance of the strategy in this country remains unchanged. Spatial planning’s principles are yet to be combined with those of prevention from further development.

2.2.6 Adopting strategies to climate change – Sweden

In Sweden all strategies are also implemented, although FRM is not considered a distinct policy domain at the national level (Ek *et al.* 2015). Instead FRM is mainly implemented as part of other policy areas (*e.g.*, risk and safety, climate change, energy). As floods vary significantly in time and space it has been considered resource-efficient to deal with them primarily by temporary small-scale defences and by evacuating people, instead of building permanent defence structures (Fiselier & Oosterberg, 2004). Emergency management and insurance are available and well developed, although not explicitly motivated by flood risk. Flood risk prevention and mitigation have recently been explicitly incorporated in legislation but these have not translated to common practice yet. In the Swedish FRM system, preparation and to some extent recovery are the most developed strategies.

Figure 2.7 Importance of strategies in the Swedish FRM



FRM in Sweden is primarily implemented at the local level. A cornerstone in the Swedish system in general is that individuals have a principal responsibility to protect themselves and their property. Consequently, the obligation for municipalities to perform rescue operations is most important in critical situations and where there is a need for quick intervention. Relatively low but significantly dispersed probabilities of floods require efficient procedures to deal with flooding when it occurs. The preparation strategy has a relatively long tradition in Sweden, particularly in terms of generic emergency management, but also to some extent in relation to flood risk. Moreover, in the last decade emergency management has begun to take a more systematic approach. The Swedish Civil Contingencies Agency was formed in 2009 as a consequence of the ambition to have a single agency with competences within emergency management, crisis management and civil defence. Overall, it can be concluded that the preparation strategy is highly institutionalised and a key strategy for Swedish FRM.

In terms of institutionalisation, the recovery strategy is the second most important for Swedish FRM. Again, this is rather a consequence of a well-functioning insurance market than the result of specific measures dedicated to managing flood risk effectively. Insurance of private houses is not mandatory but ca. 95 percent of Swedish households are insured and the availability and prevalence of (house) insurance that also covers flood-related damages indicates that the recovery strategy is also highly institutionalised.

The consequences of climate change trigger efforts to improve preventive, defensive and mitigation actions to deal with increased flood risks in Sweden. Although the necessity to avoid building in flood risk areas has recently been included in legislation as a requirement to consider flood risk in spatial planning, this has not yet been fully translated into practice, partly due to the large room for discretion in the design of the regulatory framework. In addition, some experimentation with flood-adapted building and attempts to accommodate water in urban areas is evident (*e.g.* in Karlstad and Gothenburg). Moreover, an increasing number of defence projects (now in the planning stage) are emerging at the local level, which may also have raised the importance of the defence strategy. In conclusion, prevention, mitigation and defence can be considered emerging strategies for FRM in Sweden.

Summing up, preparation is the most institutionalised strategy of Swedish FRM, followed by recovery. The significance of strategies to prevent, mitigate and defend against floods is still limited for national Swedish FRM. Prevention, preparation, defence and mitigation have gained importance in the period analysed.

2.3 Conclusions

The main questions posed in this chapter were: a) What are the similarities and differences observed in the six countries in terms of Flood Risk Management Strategies? and b) To what extent are the countries' strategies different? In all analysed countries all the flood risks management strategies (flood risk prevention; flood defence; flood mitigation; flood preparation; and flood recovery) are present but the need for diversification of strategies is evident in all countries except England, where strategies are already diversified. Connections and coordination between strategies was shown to be of crucial importance. Both diversification of strategies and dominance thereof can lead to fragmentation. Also, the presence of many different institutions can hinder a clear attribution of responsibility (*e.g.* France). Fragmentation can be more evident at national rather than local level (*e.g.* Sweden).

In practice, the implementation of Flood Risk Management Strategies in all countries is lagging behind changing discourses. At the discursive level, the importance of diversification is more and more emphasised. Preventive measures (*i.e.* spatial plans, instruments discouraging development in flood-prone areas) gained attention but there are differences in how they do in practice. As we have seen, the Water assessment in Belgium and The Netherlands, or the Planning and Building Act in Sweden are dedicated to the same purpose, but in Belgium the Water Assessment is most effective in terms of implementation. This can partially be explained by high awareness of flood risks among spatial planners. Practical implementation of FRM strategies is often hampered, for instance by path dependencies, as the subsequent chapters will show with more detailed examples. Also, capacities to realise implementation of strategies were found to be lacking.

A distinction should be made between (i) countries where diversification is the main approach towards Flood Risk Management like in England and Sweden. Here, equal importance is attached to

all strategies, and the choice for strategies is strategically informed by considerations regarding acceptable levels of risk and the types of flood hazard (*e.g.* fluvial, coastal). Diversification of strategies does not constitute an attempt to create 'back-ups' and contingencies should flood defence fail; rather it symbolises a long-established approach to FRM which accepts that floods cannot be prevented at all times. On the other hand, there are (ii) countries in which diversification is seen as the adding of backup strategies to a dominant strategy (*e.g.* Belgium, France, the Netherlands and Poland).

3 Bridging mechanisms between strategies

3.1 Introduction

The main questions of this chapter are: “To what extent are strategies aligned and with what results?” and “What are the main similarities and differences in terms of strategies’ alignment?” The chapter’s main aim is to focus on the types of mechanisms (legal, technological) that have emerged to bridge two or more strategies. In order to analyse these bridging mechanisms, we will start this chapter by providing a typology of bridging mechanisms (section 3.2). For each type of bridge between two or more strategies, we will make a comparison between the six countries (section 3.3). Section 3.4 provides our conclusions.

3.2 Typology of bridging mechanisms

Creating or intensifying interactions between strategies is essential to cope with fragmentation and this will benefit the overall functioning of flood risk management (Gilissen *et al.* 2016). In STAR-FLOOD, we coin the term ‘bridging mechanisms’ to denote the instrument (‘tool’) or mechanism that facilitates either integration between strategies and/or flood risk governance arrangements. Since the FRM system is conceptualized as the overall institutional system, comprising all (types of) actors, values, principles, norms, rules, regulations, and procedures relating to flood risk management in a country (based on Biermann *et al.* 2009) bridging mechanisms between strategies involve these characteristics. Strategies can be implemented in various institutional and governmental circumstances and this remains relevant also for the development of bridging mechanisms. In other words, in order to deliver more coherent flood risk management, bridging mechanisms are to connect actors, rules, resources and discourses in different governance arrangements. That is why these four dimensions (*i.e.* actors, rules, resources and discourses) will be applied as a conceptual framework to analyse and present ‘families’ of bridging mechanisms identified in STAR-FLOOD countries. They can be legislative arrangements, nationwide projects, policy concepts, or schemes. The typology of bridging mechanisms is presented in Table 3.1 below.

Table 3.1 Typology of bridging mechanisms

Family’ of bridging mechanism	Bridging mechanism characteristics	Examples
Actors-driven	Forums for facilitating inter-actor working; Boundary organisations.	Organisations consisting of <i>e.g.</i> scientists, (environmental) experts and/or policy-related advisory board members and other involved stakeholders
Rules-driven	Rules bridging actors; Rules bridging FRM and spatial planning; Rules bridging flood warning and emergency management.	Coordinative, cooperative; Use of flood zone mapping to inform planning decisions; Duties for emergency responders to communicate flood warnings to the public.
Resources-driven	Technological bridging mechanisms to facilitate multi-actor working; ‘Mapping’ bridging mechanisms; Financial resources to support Research & Development (R&D) programmes and uptake of knowledge into practice.	Flood Risk Maps, Flood Hazard Maps (<i>i.e.</i> Floods Directive); Use of hazard and risk maps to inform emergency management or spatial planning.
Discourses-driven	Discourses bridging FRM policy domain with other policy domains	Climate change, security dilemmas, principles of sustainability, environment conservation approach etc

By adopting this approach we need to acknowledge the interaction between these ‘bridging families’. In other words, discourses can be voiced by actors or be evident in policy and legal rules. Moreover, one should remember that a ‘planning document’ can be referred to as a resource or as a rule. In some cases it might be both. Therefore, despite coherence provided by ‘bridging mechanisms’ between strategies there has to be some flexibility in how this framework is applied. The concept of bridging mechanism will also be applied in subsequent parts of this report (see: chapters 4 and 5).

3.3 Bridging mechanisms between strategies

In this sub-section, bridging mechanisms between two or more strategies will be analysed. We will start by analysing the highest number of bridging mechanisms developed between strategies (*i.e.* prevention and mitigation) and gradually move to instruments which are not so well represented (*i.e.* between preparation and recovery). The number of bridges between strategies in the division of countries are summarised below in Figure 3.1. Arrows correspond with bridging mechanisms between particular strategies identified in the countries analysed. Bridging mechanisms represented by each arrow will be discussed in a separate sub-sections indicated in the Figure 3.1.



Figure 3.1 Bridging mechanisms between strategies in division of six STAR-FLOOD countries

3.3.1 Bridging mechanisms between prevention and mitigation – green urban infrastructure through spatial planning

Prevention and mitigation are the most bridged strategies and are valid for five EU countries, with the exception of Poland. Belgian FRM developed bridging mechanisms between these two strategies for the longest period of time while Swedish instruments have a relatively shorter history (Table 3.2).

Table 3.2 Bridging mechanisms between prevention and mitigation

Country	Description	'Bridging family'	Name of bridging mechanism
Belgium	Duty for spatial planners to consult and respect water managers.	Rules-driven	Article 136 CWATUP (in Walloon Region) Water assessment (in Flemish Region) Sigma Plan
England	Development steered to areas with the lowest probability of flooding. Requirement to establish a maintenance regime that is best suited to the local flood risk	Rules-driven	Sequential test, Exception test Sustainable Urban Drainage System (SUDS)
France	Instrument funding expropriations and most measures for vulnerability reduction.	Rules-driven Resources-driven	National Fund for Major Natural Risks (so called: The Barnier Fund)
The Netherlands	All involve water management authorities (with specific knowledge about water systems and experience in water management) in spatial decision-making.	Rules-driven Resource-driven Rules-driven Rules-driven Discourse-driven	The design of safety standards relating to land use Water management Act and water test Delta Programme
Sweden	Requirement for municipalities to take account of flood risks in their physical planning.	Rules-driven Rules-driven	Planning and Building Act Comprehensive plan for Karlstad

Due to its governmental structure, Belgian FRM exhibits two main bridging instruments: the Water Assessment for the Flemish Region and article 136 CWATUP for the Walloon Region. Water Assessment obliges spatial planning authorities to consult and respect water managers while 136 CWATUP applies to acts. Both instruments assess whether adaptive measures need to be implemented according to changes in land use. The advice is non-binding but authorities have to explain when they are deviating from it in the final permit, plan or programme. Prior to the flood of 2010, none of the instruments had been correctly and coherently applied.

The policy instruments in English spatial planning, the sequential and exception tests, were originally established in Planning Policy Guidance 25 in 2001. The sequential test aims to steer new development to areas with the lowest probability of flooding. According to this test, some types of development should not be allocated or permitted if there are reasonably available sites in areas with a lower probability of flooding. The basic premise is to ensure that inappropriate development is not situated in areas at risk; but that other types of land use (*e.g.* recreational *etc.*) should be permitted. If, following the application of the Sequential Test, it is not possible for the development to be located in zones with a lower probability of flooding the exception test can be applied. For the exception test to be passed it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk. A site-specific flood risk

assessment must demonstrate that the development will be safe for its lifetime taking the vulnerability of its users into account without increasing flood risk elsewhere, and, where possible, it will reduce flood risk overall. Linking surface water management with spatial planning additional policy bridges are established in relation to conditions for the Sustainable Urban Drainage Systems (SUDS). Recent amendments to the National Planning Policy Framework mean SUDS must now be treated as an additional planning consideration. The developer is required to establish a maintenance regime that is best suited to the local flood risk, locality and type of development (Defra/DCLG, 2014). Planning applications for developments of ten or more properties must consider options for SUDS.

The French National Fund for Major Natural Risks (usually called: The Barnier Fund) can be considered as a French example of a bridging instrument. The creation of this Fund in 1995 marked a turning point in flood management policy at a national level towards a broadening of policy scope and its funding basis. Firstly, the fund was created to finance expropriation and re-allocation and was progressively expanded to other measures (*e.g.* vulnerability reduction, infrastructure works etc.). The Barnier Fund is funded by taxes on home insurance contracts and according to data from 2014, the Fund finances expropriations and most measures for vulnerability reduction. Financed activities also include infrastructure works managed and administered by local authorities as landowners. The Barnier Fund represents also a means of involving private actors in the financing of the FRM, as the resources for the “Barnier Fund” are entirely drawn from a tax charged directly on insurance premiums (the Natural Disaster Scheme contribution – CAT-NAT).

Dutch FRM no longer only relies on hydro-technical infrastructure. Other measures have to be taken into account (Kaufman *et al.* 2015). However, bridging mechanisms between and mitigation and prevention are not so developed as in between prevention and defence. Since 1989 the Water Management Act has introduced a formal link between spatial planning, water management and environmental management in planning instruments. The water test, informally used since 2001, is also meant to involve water management authorities (with specific knowledge about water systems and experience in water management) in spatial decision-making. Measures like green urban infrastructure or use of kerbstones are implemented in an ad hoc manner. Consequently, its significance for bridging prevention and mitigation is considerable. The Delta Programme triggers cooperation between water management and spatial planning and can be considered as a bridging mechanism between prevention and other strategies, such as defence and preparation (see also: Tables 3.3, 3.6, 3.7).

One example of a legal bridging mechanism between prevention and mitigation can also be identified in Swedish FRM. The 2008 amendment to the Planning and Building Act requires that municipalities take account of flood risks in their physical planning, and this bridges prevention and mitigation, as well as actors on different levels. It has thus a similar function to the Dutch Water test. The National Board of Housing, Building and Planning strongly advises municipalities to use measures to accommodate water when planning for infrastructural developments in urban areas. Since the local level of administration in Sweden carries the main responsibility in most public domains, it is important to stress that many points of connection between different strategies may be developed mainly at the local level. In some municipalities FRM strategies are bridged to a much higher extent than at the national level (*e.g.* in Karlstad and Gothenburg); the comprehensive plan for Karlstad is one example of this. The plan specifies that a premise for planning and building is the conservation of

the function of homes, offices, industries and the functioning of water, sewerage, electricity, heating and transport and infrastructure, and it thereby adopts a holistic approach to development in the municipality. Planning an elevated pedestrian- and cycle path which will also protect the central hospital can be attributed to this combination of strategies.

3.3.2 Bridging mechanisms between prevention and defence – prohibiting and protecting development at the same time

Table 3.3 Bridging mechanisms between prevention and defence

Country	Description	'Bridging family'	Name of bridging mechanism
Belgium	Assemblage of representatives from all relevant organisations and departments Discourse for making space for water	Actor-driven Discourse-driven	Coordination Commission for Integrated Water Policy (CIW) Multi-Layer Water Safety (MLS)
France	Funding scheme like the Barnier Fund and gives privileges to preventive measures 6-year-plan aimed primarily at the safety of individuals Regulative bypass of cooperative and collaborative challenges	Resource-driven Rules-driven Rules-driven	Action Programmes for Flood Prevention (PAPI) Rapid Submersion Plan (PSR) MAPAM Act
The Netherlands	Instruments for more integrated water management	Rules-driven Rules-driven Discourse-driven	Water Act Delta Programme

In Belgium, initiatives have been launched in both regions to improve coordination between the widespread number of governmental actors involved. The Coordination Committee on Integrated Water Policy (CIW), established in 2003, is a formal institutional body that aims to increase coordination within the highly fragmented actor structure. The CIW gathers representatives from all relevant organisations and departments, *e.g.* basin boards, department Space Flanders, Waterways and Sea Canal, etc. Members of the CIW have a power advantage over actors who are excluded, since all water policy is discussed in this forum. The CIW is now considered the principal actor for water policy-making in Flanders. Moreover, recently, the 'making space for water' discourse has been challenged by Flemish actors through the employment of an emergent discourse concerning cost-efficiency, which is the second actor-driven example of a bridging mechanism between prevention and defence. According to this discourse of multi-layer water safety (MLS), FRM has to include an optimal mix of prevention, protection and preparation measures. This mix is obtained mainly through cost-benefit analyses.

The Action Programmes for Flood Prevention (PAPI) can be considered as a French bridging mechanism between prevention and defence. This is similar to funding schemes like the Barnier Fund and gives privileges to preventive measures. Thus, PAPI combines monitoring and forecasting, information, planning, protection works, reduction of vulnerability (of buildings) and crisis management at the watershed level. Nowadays PAPI is used mainly for funding defence infrastructure (*i.e.* 67 percent of all funds are dedicated to defence measures) but these are the most expensive by definition. At the local level, however, linking the capacity of PAPI still needs improvement (*e.g.* Nevers, Nice). Both PAPI and the Barnier Fund became another example of a funding mechanism limited mainly to infrastructural works (dikes and dams). At the same time the PSR, a six-year-plan aimed primarily at the safety of individuals, includes many preventive, preparatory but also protective measures. As far as bridging the strategies is concerned the

implementation of the MAPAM Act of 2014 also created a new competence for municipalities. Since they are now responsible for the management of the aquatic environment and flood prevention, it is considered that the effects of bridging the prevention, defence and mitigation strategies will be enhanced in the future. The MAPAM Act of 2014 is an example of bypassing the cooperative and collaborative challenges more intensively than the previous two bridging mechanisms (*i.e.* PAPI and PSR).

In the Netherlands coordination mechanisms have existed since 1989 in water management and have been strengthened in the Water Act of 2009. In this Act, each water plan that has consequences for spatial planning automatically also becomes a spatial plan based on the spatial planning act. The Delta plan is just a step further in the continual improvement of integrated water management. The summary of the bridging mechanisms between prevention and defence is presented in Table 3.3.

3.3.3 Bridging mechanisms between prevention and recovery – combining measures at property-level scale

There are also some efforts taken in the countries analysed in order to bridge spatial planning and insurances. These result in several bridging mechanisms developed in Belgium, France and England (Table 3.4).

Table 3.4 Bridging mechanisms between prevention and recovery

Country	Description	'Bridging family'	Name of bridging mechanism
Belgium	Compensation mechanism in case of floods	Resource-driven	Disaster Fund
France	Hybrid insurance system with obligatory involvement of the State and insurance companies Recovery funding scheme	Resource-driven Rules-driven	CAT-NAT Barnier Fund
England	Instrument encouraging insurance sector in flood adaptive development	Rules-driven Resource-driven	Flood Re

In Belgian FRM prevention is considered as a highly important strategy, hence instruments have been developed in this country to bridge prevention and recovery strategies. Again, this applies to both Flemish and Walloon Regions. The responsibility for The Disaster fund, namely the fund that operates as a compensation mechanism in case of floods, has been transferred to the level of the Regions. The regions are also responsible for the implementation of prevention measures. The fund is also administered by the Regions. So when the authorities look at each application for compensation, they assign the compensation to the province where the damage has occurred. Consequently, this instrument is considered to link prevention and recovery in a more intense way but in practice it does not do it. There is also another bridging mechanism between prevention and recovery, namely an insurance scheme which discourages people from building in high risk areas because houses built in these areas after 23 September 2008 do not benefit from the governmentally set cap on insurance fees and insurers are not obliged to insure these houses.

A French example of a bridging mechanism between prevention and recovery is the Natural Disaster Scheme (CAT-NAT). This was introduced in 1982 as a hybrid insurance system based on the obligatory involvement of both the State and insurance companies. In the case of an extreme catastrophic event CAT-NAT gives insurers the opportunity to refuse to refund in the case of non-compliance with the regulation on flood prevention. On one hand, it is very efficient since it engages both the private market and the State. On the other hand, since The State ultimately also reinsures

the insurance companies, CAT-NAT exhibits a low capacity for linking recovery and prevention. The Barnier Fund is also an important instrument to bridge preventive and recovery measures since it covers 12% of the natural disaster contributions to the home insurance income.

Within English FRM, bridging mechanisms between prevention and recovery have also been established. With the implementation of Flood Re there is an unwritten assumption that the transition to risk-reflective pricing in 25 years will incentivise homeowners to invest in *e.g.* property-level measures. The Association of British Insurers (ABI) and the government are currently producing a Flood Risk Report template for homeowners to declare their resilience measures to their insurance provider (although it is not clear how such measures will be rewarded). This demonstrates some willingness of the insurance sector to encourage adaptive development, which is an English way to bridge the strategies of prevention and recovery. However, at this point in time, this is weakened because there are no legal instruments within the Flood Re regulations to require resilient reinstatement of flooded properties; moreover there are no guidelines about making individual policy-holders aware that they are part of the Flood Re scheme and should therefore be implementing risk-reduction measures. Ultimately, how Flood Re will manifest in practice remains unclear, although it is envisaged that it will raise community awareness and enable homeowners to effectively plan for the eventual transition to risk-reflective pricing.

3.3.4 Bridging mechanisms between prevention and preparation – institutional and individual flood safety

More comprehensive approach towards FRM is achieved also by bridging activities of spatial planning and crisis management. This involves not only rules dedicated to clear division of responsibilities but also citizens. Bridging mechanisms between prevention and preparation strategies are summarised in Table 3.5.

Table 3.5 Bridging mechanisms between prevention and preparation

Country	Description	'Bridging family'	Name of bridging mechanism
France		Rules-driven Discourse-driven	Rapid Submersion Plan (PSR)
The Netherlands	Obligation to take care of the safety of citizens as an integral part of 'good spatial planning'	Rules-driven Actor-driven	Disaster plans as regular part of water management plans Water test Safety regions
Poland	Obligation for observation techniques to be combined with local spatial development plans	Rules-driven	Flood Risk and Hazard Maps (<i>i.e.</i> Floods Directive)
Sweden	Tool for citizens to investigate which water levels are estimated as a result of extreme weather in Gothenburg	Resource-driven	City Planner

Previous examples of French bridging mechanisms showed that some of them aim to link measures from two or three strategies together. At the same time, CAT-NAT and the Barnier Fund investigated previously leave a lot of room for discretion. In fact, nowadays these two bridging instruments give priority to infrastructural measures. At the same time, French FRM has experienced a change in the risk sharing discourse within French FRM which triggers measures that need to be taken by citizens. The Act on Civil Security (2004) notes that French citizens are responsible for their own safety.

Consequently, with the implementation of the Rapid Submersion Plan (PSR), preparation strategy has become more linked with preventive and protective measures (see: Table 3.5).

The probability scenario and the prioritisation of infrastructural measures are an example of the Dutch case. Since the introduction of integrated water management in 1985, and its formalisation in the Water Management Act, formal bridging mechanisms in planning instruments have been introduced. Over the years, these bridging mechanisms have been further developed, resulting in the incorporation of the Delta Programme in the National water plan based on the Water Act. Disaster plans have had to be an integral part of all water management plans since 1989. Taking care of the safety of citizens is also an integral part of the obligation of ‘good spatial planning’ in the Spatial Planning Act and the general duty of municipalities and provinces.

Recent improvements in linking strategies have also been inspired by the implementation of the Floods Directive (FD), as is the case for Polish FRM. Measuring and observation techniques need to be combined with local spatial development plans. Outcomes of this combination are as yet unknown because the process of bargaining between spatial planners and hydro-meteorological services is still ongoing. The adjustment of local plans to Flood Hazard and Risk Maps demands negotiations and clear rules in which actors should bear both financial and time costs. Nevertheless, the obligation to cooperate has improved links between these two formerly fragmented policy fields.

3.3.5 Bridging mechanisms between defence and preparation – how to be protected and respond to floods at the same time?

Fighting with water and being prepared for action in case of flood is quite a tricky issue. This involves combining infrastructural measures with those of crisis management. In almost all STAR-FLOOD countries, except Sweden, bridging mechanisms between defence and preparation have been identified (Table 3.6).

Table 3.6 Bridging mechanisms between defence and preparation

Country	Description	‘Bridging family’	Name of bridging mechanism
Belgium	Single point of contact for crisis managers.	Actor-driven Discourse-driven	Walloon Crisis Centre
England	Property level measures that can be either permanently installed or installed in preparation for a flood.	Actor-driven Resource-driven Discourse-driven	Extensive activities to raise community awareness and encourage households
France			Rapid Submersion Plan (PSR)
The Netherlands	Collaborative rather than bargaining method to find a solution for most effective actions. Requirement for emergency plans be part of water plans	Rules-driven Actors-driven Discourse-driven	Delta Programme Multi-layered Safety (MLS) Security Regions Act Water Act of 2009
Poland	14 year-long Programme established as a combination of plans and projects from different sectors and financed from national and international funds	Rules-driven Resource-driven Actor-driven	Programme for the Odra River – 2006

Multi-Layered Safety (MLS), even though very much still developing and by far not yet established in legislation, is one of the Dutch examples of policy concepts developed within earlier national water planning and the broader framework of the Delta Programme. A similar example of MLS can also be indicated for the Belgian bridging mechanism but as previously stated, the latter rather links prevention and defence. Currently the pilot programme on multilayer safety in the Netherlands is

being implemented in Dordrecht and has made an important step towards linking the prevention, defence, mitigation and preparation strategies. The programme has initiated a more collaborative rather than a bargaining method to find a solution for the most effective actions to be taken. The involvement of spatial planners and emergency managers has increased. Since MLS is an instrument which prioritises economic efficiency as a means of assessing particular projects, investment in defence measures can mostly be justified. Thus, taking a closer look at MLS reveals that it should be considered as a framework in which concrete instruments are being developed to bridge strategies. However, ultimate long-term effects are yet to materialize.

The formation of security regions has improved emergency management, although the resulting reorganisation is still ongoing. It provided the basis for the establishment of cooperation between water management authorities and Security Regions resulting in bridges between both strategies. Currently, there are 25 Security Regions in the Netherlands and these are generic emergency management authorities. According to the Water Act of 2009, water authorities, in addition to their traditional tasks in flood defence, also have a legal responsibility regarding flood preparation as they have to establish emergency plans as part of their water plans. These plans must be substantively aligned with the crisis plans established by the Security Regions (under the Security Regions Act 2010). The security regions also deal with bridging preparation and recovery (see: table 3.8). With regard to the bridging capacities between preparation and recovery, a lack of recent severe events in the Netherlands prevents an assessment of the effectiveness of Security Regions.

A similar initiative has also been taken in Belgium. In anticipation of the large number of actors at the regional level, the Walloon Government decided in 2007 to establish a single point of contact for crisis managers. This Walloon Crisis Centre (CRC-W) is not a crisis manager as such, but it groups the expertise and competences within the Walloon government administration in case of emergencies. Moreover, policy entrepreneurs (rather than politicians) can also be considered as the driving force behind the integration of water management with spatial planning and particularly with crisis management in the Walloon Region. As a consequence both flood cartography and crisis management have improved.

A flood in 1997 triggered a variety of activities to establish nationwide schemes in Polish FRM. One of the results from these efforts is the Programme for the Odra River – 2006. This lasted for 14 years and initially was a comprehensive project including prevention, defence and mitigation measures. The combination of plans and projects from different sectors and financed from national and international funds involved investments in inland waterways, development of defence infrastructure, mitigation activities (*i.e.* afforestation initiatives in rural areas), spatial planning and even incentives for insurance to some extent. Emergency management has also been highly involved in Programme elaboration processes. Eventually the Programme evolved into an infrastructure-oriented action plan focused on defence measures such as dry flood-control reservoirs and modernisation of the Wroclaw Water Junction. The bridging of defence and preparation strategies has improved due to the establishment of this Programme.

Also in England, it should be stressed that there are extensive activities to raise community awareness and encourage households to implement property level measures that can be either permanently installed or installed in preparation for a flood (*e.g.* flood gates). English prominent flood management institutions are involved in activities to raise community awareness and encourage the uptake of property-level resistance and resilience measures; however, this is highly

variable from place to place. The summary of the bridging mechanisms between defence and preparation is provided in Table 3.6.

3.3.6 Bridging mechanisms between defence and mitigation – accepting water and fighting with water in urban areas

Since 2003, local governments in Flanders and Wallonia have had instruments at their disposal which allow them to actively monitor water interests when delivering building permits (*i.e.* water assessment and art. 136 CWATUP). This is due both to an increased awareness, triggered by flood events, and to a reform of the tool in 2012, which simplified its application. Nowadays, in medium and low risk zones, building is permitted under the condition that there is no elevation of the domain. The applicant has to state which measures are being taken concerning flood vulnerability, and additional measures can be imposed. For every building permit in these areas, advice has to be sought from the water manager involved, according to art. 136 CWATUP (Table 3.7).

In the Netherlands the water test procedure enables the water authority to give advice to the spatial planner with regard to the spatial zoning plans. The advisory role of water authorities was reported in some country regions. Besides the official advice (as part of the water test), the regional water authority has advised the province regarding the development of some measures (*i.e.* polders). In the water test, also floor levels for housing are included into Spatial Zoning Plans. The raised floor levels are nowadays framed in the discourse as ‘extra safety’ for the property buyers so this advice has no legal basis, but influences multi-measure decision-making processes.

Table 3.7 Bridging mechanisms between defence and mitigation

Country	Description	‘Bridging family’	Name of bridging mechanism
Belgium	Legal obligation to consider water issues in land use development	Rules-driven Actor-driven Discourse-driven	Article 136 CWATUP (in Walloon Region) Water assessment (in Flemish Region)
The Netherlands	Obligation to cooperate in urban water management between water authorities and municipalities	Rules-driven Actor-driven	The Water Act Delta Programme Water assessment

3.3.7 Bridging mechanisms between preparation and recovery – local authorities returning to normal state

The Bellwin Scheme is an English bridging mechanism established between preparation and recovery strategies. It is a central government-funded and organised approach which provides funding for unexpected losses to local authority functions (Local Government and Housing Act 1989). The use of minimum spending thresholds, to determine eligibility to receive financing under the Bellwin Scheme, was introduced to ensure that authorities undertake some contingency planning and set aside a proportion of their budget to deal with emergencies. These regulations and limits on reimbursement are used to encourage local authorities to build in a degree of resilience and adaptive capacity (Table 3.8).

Table 3.8 Bridging mechanisms between preparation and recovery

Country	Description	‘Bridging family’	Name of bridging mechanism
England	Fund for unexpected losses to local authority functions	Resource-driven Rules-driven	Bellwin Scheme
The Netherlands	Obligation for water management	Rules-driven	Water Act

	authorities to address some aspects of recovery in the water plans (within calamity or emergency plan).		
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3.4 Conclusions

In this chapter we address the questions: “To what extent are these strategies aligned and with what results?” and “What are the main similarities and differences?” Diversification of FRM strategies may lead to fragmentation between actors, levels and sectors. While such fragmentation does not need to be problematic, it may be if it leads to inefficiencies, trade-offs between strategies or underinvestment in several strategies. To counteract this fragmentation, all countries have applied and are applying so-called bridging mechanisms between strategies. Bridging mechanisms are conceptualised as policy instruments or related procedures that facilitate integration between strategies and/or flood risk governance arrangements.

There is a variety of bridging mechanisms between strategies in the analysed countries. In most cases, these bridging mechanisms link prevention, defence and mitigation strategies. This is the case in Belgium, the Netherlands and France to some extent. Some of the mechanisms, dedicated to overcome fragmentation of strategies, bridge particular pairs of strategies (*e.g.* prevention and mitigation or preparation and recovery) while other instruments address the problem of fragmentation by bridging more than two strategies (*e.g.* multi-layered Safety in the Netherlands, water assessment in Belgium or MAPAM Act in France).

We found differences in the number of dimensions of the PAA that the identified bridging mechanisms took into account. Some bridging mechanisms focused only on, for instance, actors or rules while other instruments were found to be more comprehensive. Although this does not lead directly to the conclusion that ‘the more dimensions of governance involved, the better’ some examples of bridging mechanisms support this argument (*e.g.* Delta Programme in the Netherlands).

Finally, in England and Sweden we also found bridging mechanisms *within* particular strategies. Hence, the absence of bridges between strategies does not preclude the absence of formal cooperation mechanisms within the arrangement. Further analysis of this is provided in chapter 4.

4. Comparative analysis of Flood Risk Governance Arrangements in six European countries

4.1 Introduction

Following the conceptual framework of the STAR-FLOOD project, this chapter compares the Flood Risk Governance Arrangements (FRGAs) between countries. The questions addressed in this chapter are: “What are the similarities and differences that can be observed in the six countries in terms of Flood Risk Governance Arrangements? What are the main institutional patterns of Flood Risk Governance Arrangements and to what extent do they differ between countries?” Section 4.2 presents the method of analysis. Section 4.3 compares the overall governance structure of the STAR-FLOOD countries, while section 4.4 deals with the internal structures of each national FRGA.

4.2 Method of analysis

The objectives of this chapter are to compare the overall governance structure of STAR-FLOOD countries (*i.e.* Flood Risk Governance Arrangements) and then the internal structures of each national FRGA (*i.e.* sub-FRGAs, or sub-arrangements). ***Our aim is to highlight the similarities and differences observed in the six countries in terms of Flood Risk Governance Arrangements. What are the main institutional patterns of FRGA and to what extent do they differ country per country?***

Through this comparison, several questions will be addressed. Especially, to what extent flood risk governance rely on multiple sectors (is flood risk management independent or integrated in other policy domains?); multiple actors (involvement of market and civil society actors); and multiple levels (different governmental levels)? How actors, flood risk management strategies (FRMSs) and policy domains are interconnected? What types of rules are present and how are they implemented? Under what conditions public and private resources are mobilized for FR governance?

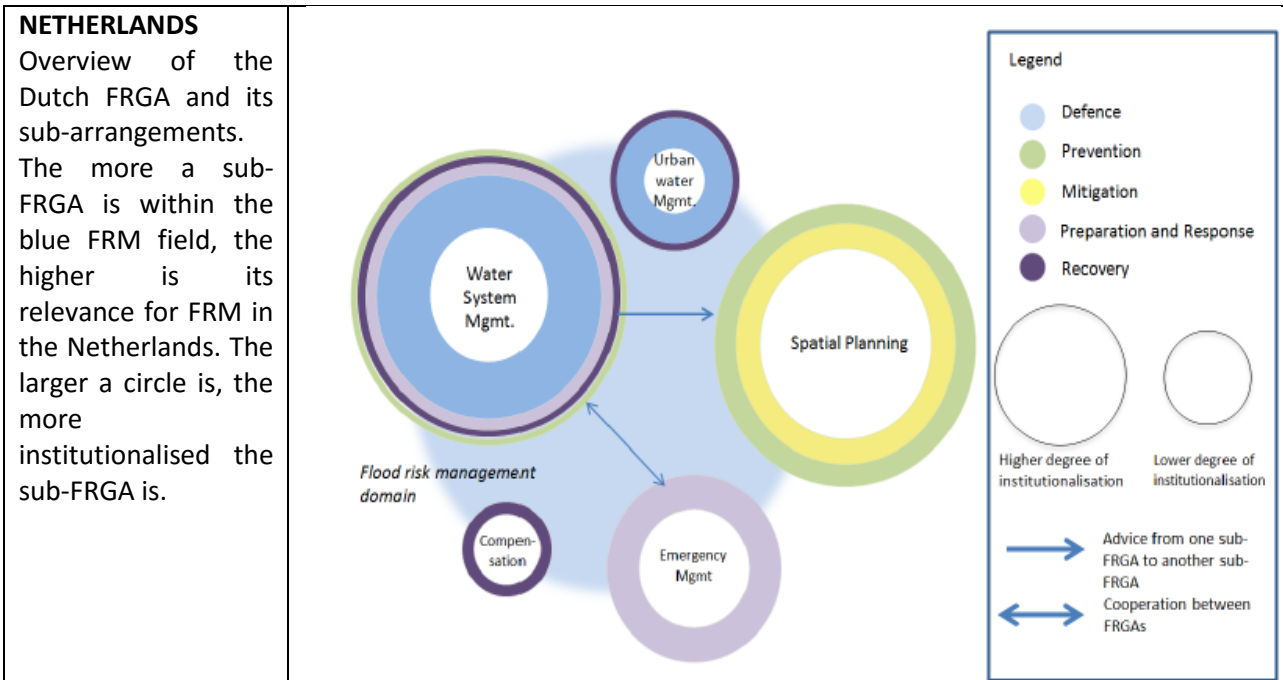
The comparison of flood risk governance will be conducted in two stages.

1. First, at the Flood Risk Governance Arrangement (FRGA) level: this is where we examine the profile of the overall FRGA in each country. How do different sub-FRGAs in one country together produce the overall FRGA? Are sub-FRGAs balanced or unbalanced? To what extent do FRGAs include a variety of Flood Risk Management Strategies (FRMSs)? We then compare these aspects between all the STAR-FLOOD countries. This step enables us to compare the general organisation of flood risk management policies from a general perspective.

Figure 4.1 describes how sub-arrangements in one country together produce the overall FRGA. It also presents the number of sub-FRGAs, their relative importance/degree of institutionalisation, and the FRMSs that are incorporated in those arrangements. These symbolic diagrams will help us performing the following comparison although they don't offer comparative data in quantitative terms. It should also be acknowledged that some visual differences in the FRGAs simply reflect how researchers have chosen to illustrate their national FRGA in WP3 reports – for instance, in England the numerous bridging mechanisms deliberately not illustrated in order to make the diagram more readable.

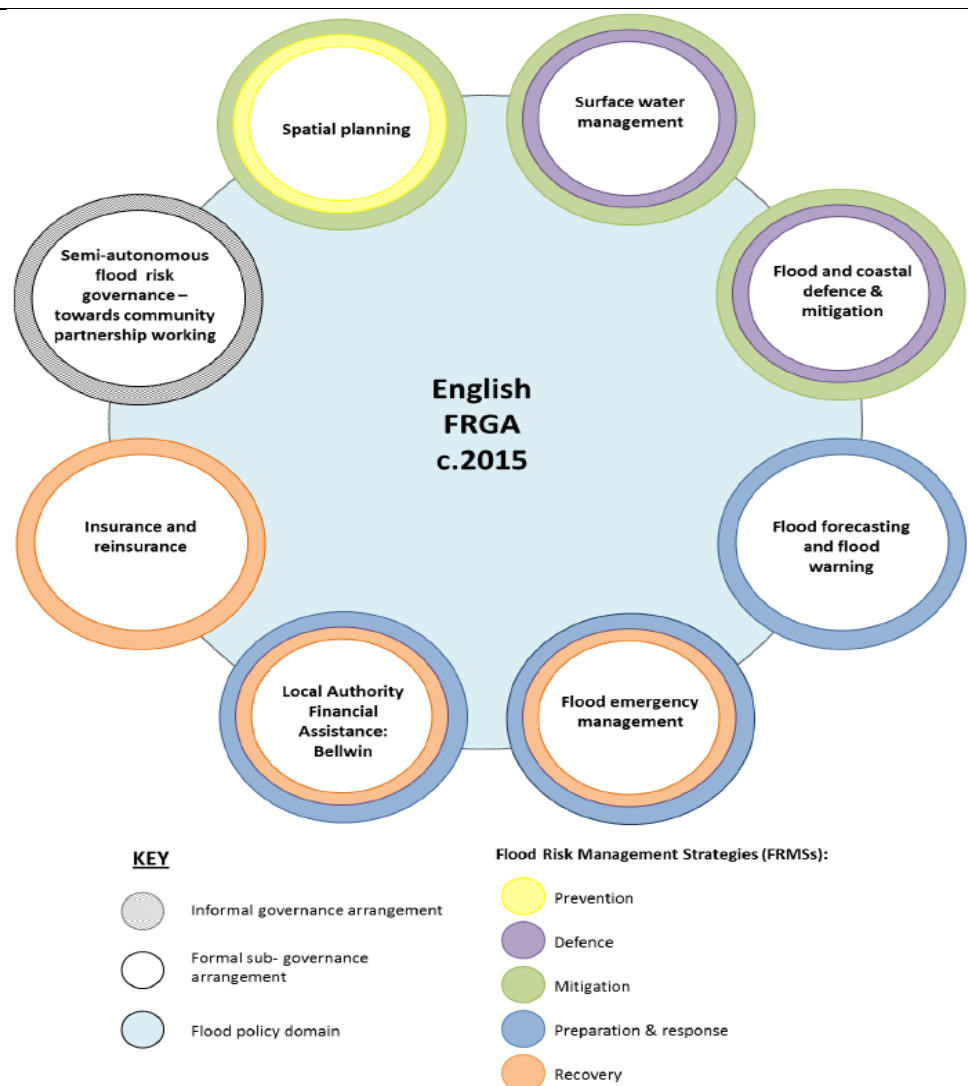
Cross-country analysis reveals a number of similarities as well as differences in the structure of national flood risk governance arrangements in the STAR-FLOOD countries. Whereas some countries display multiple sub-FRGAs (*e.g.* England, France), others are characterised by fewer and larger sub-FRGAs (Netherlands, Belgium and Poland). Another important observation concerns how FRMSs are

embedded within the national arrangement. Whereas some FRMSs are governed within one distinct sub-arrangement, others overlap multiple sub-arrangements. Adopting a high level perspective, this section discerns a number of patterns in the similarities and differences between the STAR-FLOOD countries.



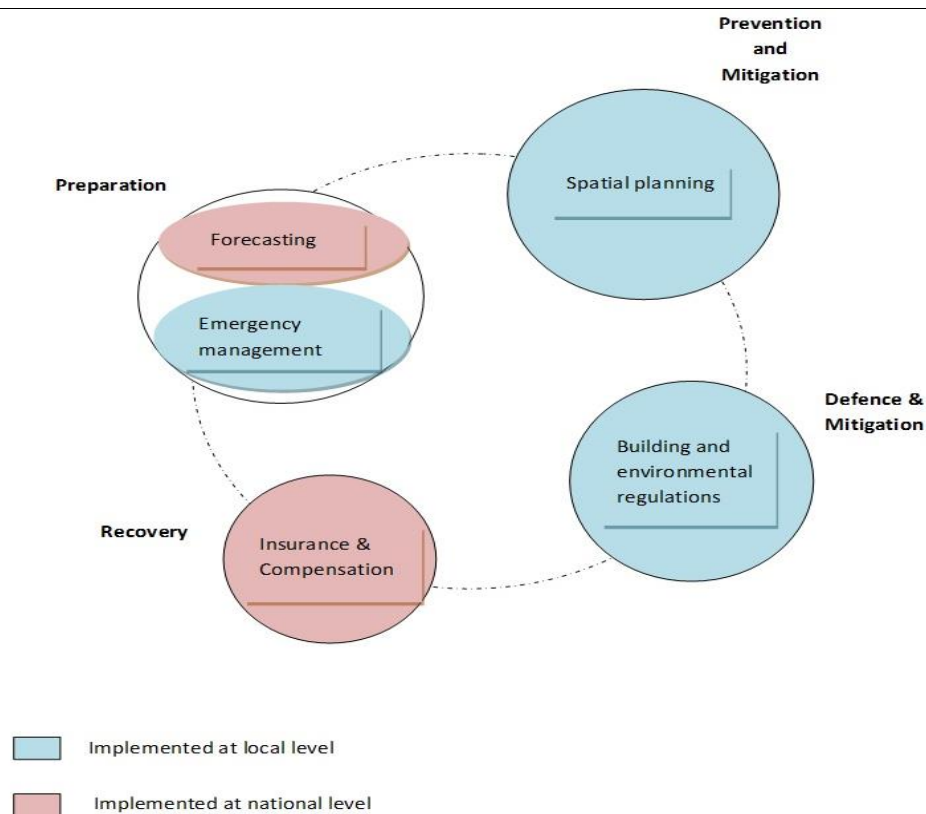
ENGLAND

The national FRGA. Each sub-FRGA represents a distinct arrangement of actors, rules, resources and discourses related to key goals in FRM. These sub-arrangements are related to one or more FRM Strategies.

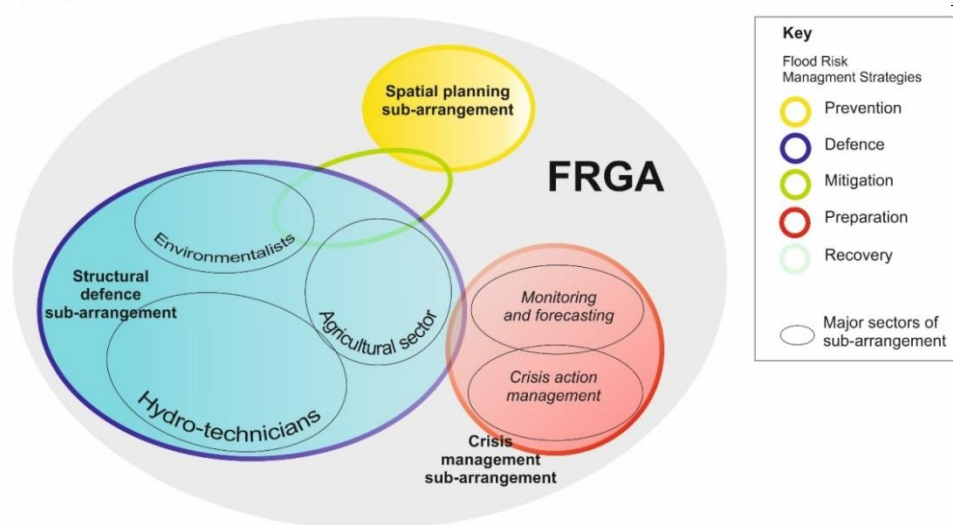


SWEDEN

Overview of the Swedish flood risk governance arrangement and its sub-arrangements. The colors relate to different implementation levels. The larger a circle is, the more dominant the sub-FRGA is.

**POLAND**

Overview of the Swedish flood risk governance arrangement and its sub-arrangements. The larger a circle is, the more dominant the sub-FRGA is.



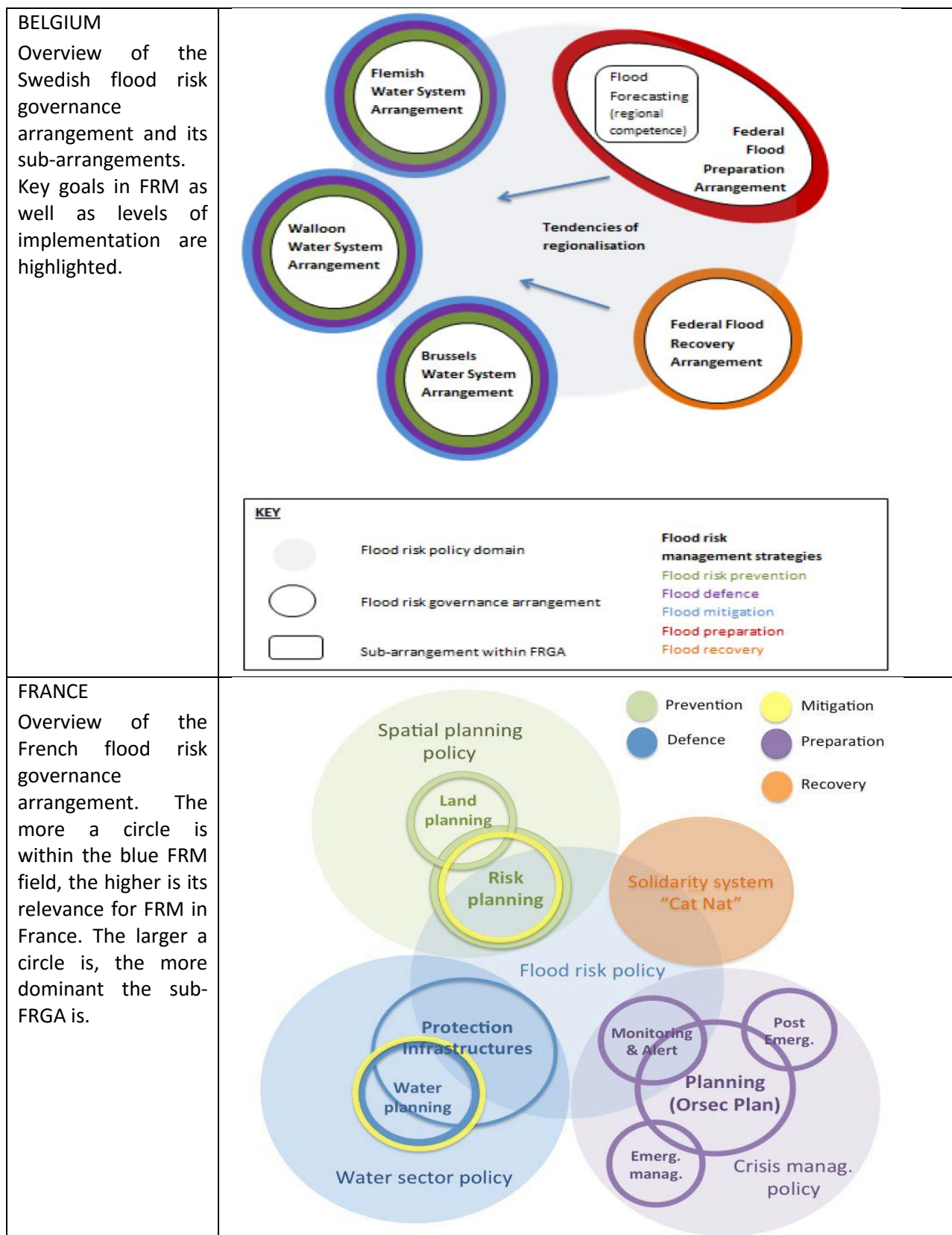


Figure 4.1 Overview of national Flood Risk Governance Arrangements in the STAR-FLOOD countries.

Each sub-FRGA represents a distinct arrangement of actors, rules, resources and discourses related to key goals in FRM. These sub-arrangements are related to one or more FRM Strategies (colors). Most of the diagrams also show how integrated in the national flood risk policy domain those sub-arrangements are.

2. Second, the sub-arrangement level: this level compares in more detail the internal aspects of the national FRGAs. Through this comparison, each sub-FRGA is tackled through the four dimensions of the Policy Arrangement Approach (actors, rules, discourses and power and resources). Here, we identify the characteristics on which the different sub-FRGAs are based. Significant differences and similarities emerge from this comparison. Table 4.1 below synthetically describes the types of sub-arrangements present in each country. It synthesizes the idea that similar governance sub-arrangements can be related to different policy areas. This table also shows that for the same type of sub-arrangement, some characteristics can vary from country to country, highlighting some original features. Section 4.3 describes in detail the similarities and differences.

Through this double analysis, we will draw comparative conclusions on the various modes of governance related to FRM. It will be shown how STAR-FLOOD countries are similar or different in terms of multi-sector governance, multi-actor and multi-level. Chapter 5 will then explain how and why those governance features are changing or stabilising, while Deliverable 5.2 will evaluate them in terms of resilience (Work Package 5).

4.3 A cross-country comparison of the overall flood risk governance structure

On the basis of classical dimensions for analysing actors' arrangements (see for instance Knoepfel *et al.*, 2007: 174), we decided to use three different basic criteria to understand each country through their FRGA analysis. The matrix gives some first insights but we propose to go through an overview of each country's FRGA general organisation and to see if some patterns emerge from this analysis. Analysing the FRGAs as illustrated in figure 4.1, three features can be highlighted for comparing the STAR-FLOOD countries:

- 1) **Dominance:** Are sub-FRGAs Balanced/unbalanced? Is there a form of dominance of a/several sub arrangements over the others? Or on the contrary is there an equilibrium between sub-arrangements with sub-arrangements of similar importance? The analysis will focus on a twofold aspect: importance in terms of the four dimensions of the PAA (importance in terms of actors, resources, rules and discourses). And relative importance in terms of institutionalisation: are the sub arrangements rather informal or highly institutionalised?
- 2) **Internal diversity of FRGAs (integration of FRMSs within sub-FRGAs):** What are the strategies present in each sub-arrangement? When a large number of strategies is present in a sub-arrangement it can be characterised as a diversified sub-arrangement. On the contrary, when there is a low number of strategies it can be characterised as a monolithic sub-arrangement.
- 3) **Independent vs integrated sub-arrangements:** This last criterion focuses on the relationship between the flood risk management policy and the other policy domains. It appears that some countries have an independent flood risk management policy domain whereas other countries have a flood risk policy that is integrated fully or partially to other policy domains. This level of independence of the flood risk management policy can help us characterise each of the six STAR-FLOOD countries.

As a starting remark, it is important to keep in mind that this comparison between all the six countries' Flood Risk Governance Arrangements relies on the current status of the flood risk management policies. It is a snapshot of the present state of the flood management policy in each country, and it does not take into account the constant evolutions going through each of these FRGAs. Although this analysis will use some explanatory factors to help understand the

characterisation of the FGRAs it will not focus on the potential motions or trends that are remodelling the sub-arrangements' number, balance or place (see chapter 5).

4.3.1 Balanced vs dominant sub-arrangements



Figure 4.2 Illustration for balanced vs dominant sub arrangements

This first characteristic is highly significant in the sense that it gives a direct view of what policy choices have been made and how the flood management policy is prioritised. Based on section 4.1, this section completes the governance profile of the STAR-FLOOD countries as it shows whether the sub-arrangements presented above are balanced or if some of them (and which) dominate the others. The relative dominance of governance arrangements is often linked to their degree of institutionalization, their influence over the FRM or other governance arrangements. Sub-arrangements which dominate others are usually the product of an overwhelming policy over the others, or a highly path-dependent strategy. Whereas a balanced FRGA is more the sign of a flood management policy using every means at its disposal at a more or less equal level (see chapter 5).

The Netherlands and England give us great opportunities to illustrate this contrast. On the one hand, in the English case, all of its eight sub-arrangements are balanced, with each of them considered as being of the same level of importance. This means that the English flood management policy has not prioritised any choice or any strategy more than any other and is relying on a multipronged approach to manage the flood issue. The flood risk governance structure in Sweden is also quite balanced. However, preparation and recovery are more institutionalised than the other FRMSs and they can therefore be described as rather dominant.

On the other hand, the Netherlands is the perfect opposite. The water system management sub-arrangement (see section 4.3) dominates all the others and at all levels. The water system management sub-arrangement can be considered as a macro-arrangement. The clear choice made by the Netherlands to fight against floods is obvious in the way that the Flood Risk Governance Arrangement looks. The water system sub-arrangement determines the global organisation of the Netherlands FRGA. This does not mean that the other sub-arrangements are insignificant, but it is true that their influence on FRM is diminished due to the importance of the macro-arrangement for water system management. However, bridging mechanisms have been developed over the years to embed other FRGA within the water management arrangement. For instance, the sub-arrangement for recovery plays a minor role and can be considered as the least institutionalised sub-FRGA, mainly due to the low frequency of flood events. It is clear that the actors' system gravitating around water management, the amount of resources invested in the water infrastructures and the rules and measures linked with the water system makes the Netherlands a highly particular case. Similarly, the FRGA of Poland is also clearly unbalanced, with the structural defence sub-arrangement being much more important than the crisis management (although recent evolutions have strengthened the role of crisis management) or the spatial planning sub-arrangements. The unbalanced character of the

Polish FRGA can be explained mostly by the fact that the Polish flood management policy is mainly based on the defence infrastructures (see chapter 5).

What can we conclude from the balance of each FRGA about the modes of governance? What does balanced FRGA mean compared to an unbalanced case? How is flood risk management delivered from a governance point of view? When each sub-arrangement equally influences FRM policies (balanced FRGA), is it possible that an increase in actors and levels of governance is facilitated because there is no “monopoly” of a single actor or group of actors? In the English case, which has a perfectly balanced FRGA with a large number of sub-arrangements, the diversity of sub-FRGAs largely reflects the piecemeal nature of development, which the legal system allows. Nonetheless, there are still some dominant actors and actors with ‘many fingers in many pies’. The multipronged implication of actors in several flood risk management tools and policies delivers a mode of governance characterised by an equilibrated FRGA where sub-arrangements are closely interlinked (see below). In Sweden, similarly, private actors (*e.g.* landowners and hydro-power companies) seem to have somehow balanced roles compared to public actors at the level of the whole FRGA. On the contrary, it is likely that the domination of a single governance arrangement can limit the scope of actors if the dominating sub-arrangement involves a limited range of actors. This is noticeable in the Netherlands where no shift took place in regard to multi-actor governance, *i.e.* towards private actors, except for urban flooding. Administrative authorities remain the main responsible parties for providing protection from flooding. The situation is similar in Poland, because the structural sub-arrangement for defence is clearly dominated by public water engineers (see section 4.3). In this country too, no shift towards multi-actor governance can be witnessed.

Regarding other countries, the differences seem a bit less obvious. In the French case, the FRGA is a little more balanced, although the sub-arrangement for prevention (see section 4.3) is considered as a macro sub-arrangement (but in a different way to the Dutch water system sub-arrangement). In the French case, the prevention sub-arrangement is considered as most important in the sense that it is a transverse sub-arrangement, being able to influence the four others. It is different from the Netherlands, where the four dimension of the Policy Arrangement Approach (actors, rules, powers and discourses) overpower all other sub arrangements. In the French case, if we look at the resource dimension for instance, the financial power invested in the prevention sub-arrangement is clearly below the recovery or the defence sub-arrangements. The prevention sub-arrangement is mostly characterised as dominant because of the influence it has over the whole French flood management policy (in terms of actors, rules and discourses).

The dominance of the sub-arrangement for prevention illustrates the French floods governance structure. The actors related to this arrangement tend to dominate, *i.e.* mainly public actors. However, this arrangement is closely linked to the recovery arrangement and also, to some extent, to the sub-arrangement for defence. Because of the links between these three arrangements, we can consider that the dominance of an arrangement does not mean necessarily the dominance of a certain group of actors. These connections between these arrangements allows interaction between public and private actors.

In Belgium, the FRGA is both balanced and unbalanced. This twofold aspect of the general equilibrium of the Belgian case is directly linked to its federal organisation. On the one hand, there is an unbalanced situation as the recovery and the preparation sub-arrangements are at the federal level and the water system sub-arrangements are at the regional level. The federal level sub-

arrangements are in a way, dominating/more institutionalised than the regional level sub-arrangements. Although in Belgium federal legislation does not override the regional level. On the other hand, if we consider the sub-arrangements of the regional level, they are quite balanced: in other words, in general the Belgian FRGA is balanced. In practice, prevention still does not play an important role but in terms of legislation a lot has happened in recent years. Preparation is an underinvested strategy and therefore less prominent than the others.

4.3.2 Inclusiveness of FRMSs within sub-FRGAs

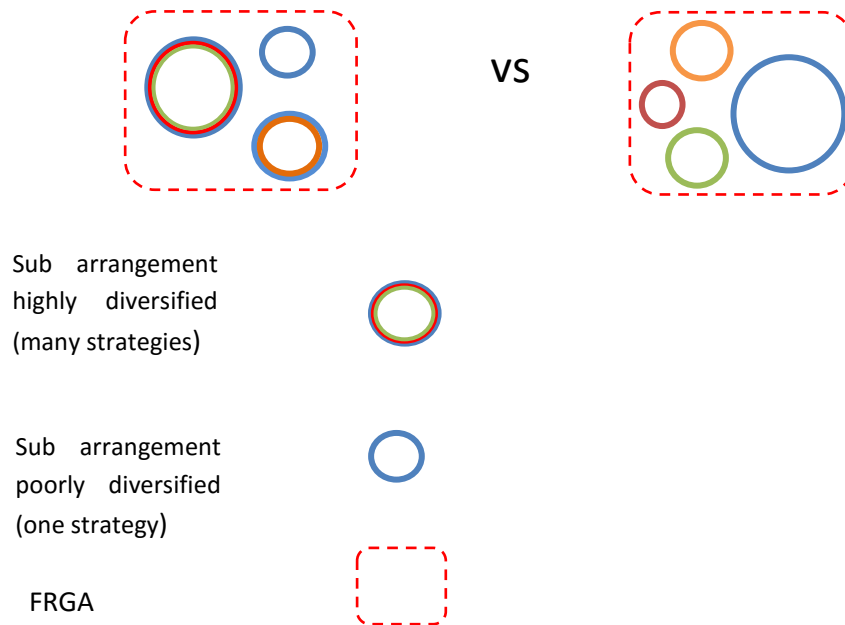


Figure 4.3 Illustration for inclusiveness of FRMSs within sub-FRGAs

This second criterion can help us characterise each country in terms of the amount of diversification of Flood Risk Management Strategies (FRMSs) present in each sub-FRGA. In contrast to chapter 3, this part will focus on the FRMSs within the sub-FRGA. It will allow us to characterise each sub-arrangement as highly diversified or monolithic. The overall picture of each country will give some insights into how diversification of strategies through bridging mechanisms is delivered and at what level. What can be said as a preliminary remark is that all six STAR-FLOOD countries have the five strategies present, from prevention to recovery.

The analysis of this criterion tends to organise the comparison of the six countries into three groups.

- *First, the monolithic FRGAs such as Poland:* this country has one sub arrangement for one strategy, except for mitigation which is not significant enough to be considered as a consolidated sub arrangement. Therefore, Poland has four sub-FRGAs: prevention, defence, preparation and recovery. They are very few connections between FRMS to be considered within the sub-arrangements. This monolithic aspect of the sub-arrangements tends to show a lack of an integrative approach in the actors, rules, resources or discourses dimensions or any attempts to give a diversified answer to flood risk management within a specific sub-arrangement. In the Polish case, this characteristic can be explained by the relatively new approach to flood management and the quite basic means that should be considered in a first place (see chapter 5).
- *Second, a middle ground approach with rather poorly inclusive sub-arrangements.* In the French

case, the sub-arrangements involved between one and two strategies. Some links between FRMS are established within the sub-arrangements such as recovery, which is linked to prevention through the CAT NAT regime or the spatial planning sub-arrangement that involves two FRMS, prevention and mitigation. The water system management also makes some bridges between the defence and the mitigation strategy. On the other hand, some sub-arrangements are completely monolithic such as the crisis management sub-arrangement that involves only the preparation strategy. In the English case, sub-arrangements are related to one or two FRMSs. Through different activities and tasks, involving mitigation and prevention strategies, the spatial planning sub-arrangement forms some links between those two strategies, mostly through the measures that this sub-arrangement implements in the field. The surface water management and the fluvial and coastal management sub-arrangements also incorporate both defence and mitigation strategies. On the other hand, some sub-arrangements are also monolithic such as the insurance and reinsurance sub-arrangement or the flood forecasting and flood warning sub-arrangements. Both of these cases, French and English, are therefore characterised by a mostly monolithic aspect of its sub-arrangements with some of them having a low level of diversification. The monolithic or diversified aspect of sub-arrangements do not necessarily imply a poor degree of resilience or efficiency at the FRGA level. For instance, the English FRGA involves a large number of bridging mechanisms to compensate for the fact that it has many sub-arrangements. Therefore, although the English case is not characterised by a high diversification within the sub-arrangement, its overall FRGA is probably the most diversified in terms of strategies compared to all the other countries.

- *Third, a high degree of inclusiveness is present in two countries, Belgium and the Netherlands.* These two countries have sub-arrangements that involve more than two strategies. First, the Netherlands is quite specific in the sense that the water system management sub-arrangement uses four FRMSs at the same time. This so called “macro sub-arrangement” establishes some links between an overall strategy, defence, and other more “satellite” strategies such as prevention, preparation or recovery. This very high level of integration within one sub-arrangement can be explained by several elements. First, the size of the sub-arrangement: indeed, the overwhelming aspect of this sub-arrangement over the others also explains its level of complexity. The number of actors, rules or discourses is sufficiently important to make some diversification possible. What is most interesting to note is that the defence strategy remains the core of the sub-arrangement and it is by way of bridging mechanisms that diversification takes place without leading to fragmentation. There is a sprinkling of other measures attempting to make the water system management sub-arrangement evolve to a more integrative aspect. From the discourse dimension point of view, the urge for diversification of flood management is starting to become performative and produces some effects as some measures are taken in this way. Nonetheless, the water system management remains focused on a defensive strategy and what deeply characterises the Netherlands case is that protection measures are still predominant. Finally, Belgium also has a highly diversified FGRA as the three regional sub-arrangements are all composed of three FRMSs, namely prevention, defence and mitigation. The water system management approach seems to be linked with the amount of diversification within the sub-arrangements as is also the case in the Netherlands.

As a conclusion, we can relate this criterion to the former one, that is to say dominance. Indeed, they are two main types of FRGA: on the one hand, FRGAs where sub-arrangements are unbalanced, have

some dominant sub-arrangements including a large number of FRMSs and on the other hand some FRGAs that are quite balanced and all sub-arrangements are of equal importance and where only a few strategies are present per sub-arrangement. In other words, the more the FRGA is balanced, the more the strategies are spread over the sub-FRGAs. The less balanced, the more the sub-FRGAs are included. We will not discuss here the implications of this conclusion from an evaluative perspective, but we can say at least that this contrast between the cases implies different ways in how flood risk management policy is managed and delivered in terms of governance. It gives a good understanding of how each country has built its own particular system to deal with flood risk.

This conclusion can be verified for nearly every country. The only exception is the Belgian case, where most of the sub-FRGAs are balanced, although they are quite highly integrative. This fact can be explained by a multi-level governance approach as Belgium is a federal system and the sub-arrangements structure is mostly dependent upon a region-based approach.

On the other hand, for the five other countries, the distinction between sub-FRGAs is mostly based upon multi-sector governance analysis. Indeed, the sub-FRGAs are defined according to more policy-based criteria *e.g.* water management, spatial planning etc.

4.3.3 Independence vs integration of the flood risk management policy domain

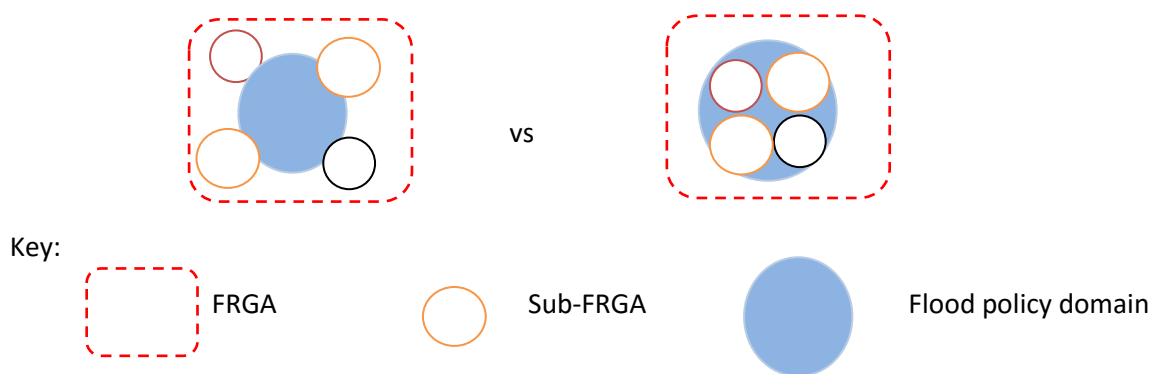


Figure 4.4 Illustration for independence vs integration of the flood risk management policy domain

An analysis of the independence versus integration of the flood risk management policy domain has been made in each country. Also, an assessment has been made of how each sub-arrangement is positioned in relation with other specific policy domains. Two situations are indeed possible. On the one hand the sub-arrangements are centred on a specific flood policy domain and therefore, flood management constitutes an independent policy field in itself. On the other hand, in some other situations, the sub-arrangements are exterior to a specific policy field and the country is characterised by the lack of a clear and independent policy domain dedicated to flood management.

First, France and the Netherlands have a specific flood policy domain.

- In the French case, it is natural disaster management in which flood policy is considered as a whole policy in itself, as most of the actors, discourses, resources and especially rules focus on it with reference to a more current disaster, *i.e.* floods. The PPRI is the main rule in spatial planning and is especially dedicated to flooding. The protection measures are related to water management, but the flood warning and forecasting are completely independent from other

policy fields. The only sub-arrangement which is not considered as being fully part of the flood policy domain is crisis management, as in the French case, crisis management is entirely generic and works for any type of risk (natural disasters, industrial risks etc.) But for most of the sub-arrangements, a specific flood policy is settled making France a case with an identified policy domain dedicated to flood issues within natural disaster issues.

- In the Netherlands, the flood issue also constitutes a specific policy field. Although it is fully integrated in water management, at the same time the flood issue receives specific policy attention. Indeed the water system sub-arrangement constitutes most of the flood policy domain whereas the four other sub-arrangements are rather more related to other policy fields, even though they also take part in the flood management policy field. In The Netherlands integrated water management, including flood protection, leads to solutions where improvement of ecological quality (WFD) is often combined with flood protection. However, from a legal point of view flood risk management is not entirely a separate policy field.

Second, Poland, Belgium and England have their sub-arrangements partially related to a flood policy domain but also to other policy fields:

- In Poland, a specific policy domain is also dedicated to floods. Nevertheless, since the major events of 1997 and 2010, the flood management policy has emerged as a semi-independent issue through the rise of crisis management, which is a multi-hazard focused policy. It seems that the urge of the public authorities to tackle the flood problem has not completely led to the composition of a designated policy domain. In Belgium, the federal sub-arrangements not only address flood risks but also other societal risks. The three regional sub-arrangements, on the other hand, are completely focused on water quantity issues (although indeed also related to water quality issues). England is somewhere in the middle, *i.e.* it has a distinct FRM policy domain, but with many overlaps with multiple other policy domains. In other words, the key point with the English system is that firstly there is a distinct FRM policy domain. Then secondly, this policy domain does interact with other policy domains, such as welfare, climate change, environment, civil contingencies, spatial planning, private market insurance and reinsurance and water management.

Finally, the Swedish case is singular as the flood policy domain does not exist at all in itself. The whole flood issue is entirely related to other policy fields such as environment issues or hydroelectric power issues.

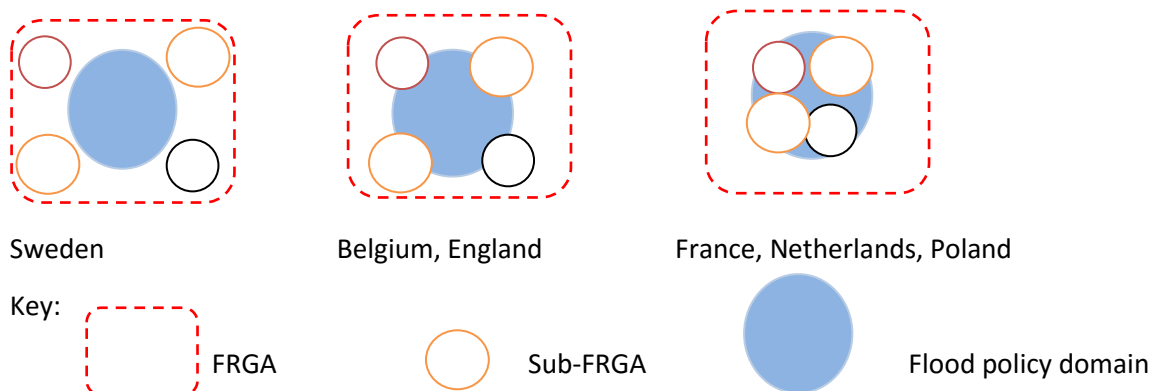


Figure 4.5 Illustration for FRGAs in Sweden, Belgium, England, France, Netherlands and Poland

4.3.4 Conclusions

We have shown that the FRGA structure differs country by country: sub-arrangements do not have the same importance, they do not interact in the same way, and they also participate in various ways to the integration of FRMSs and the inclusion (or not) of flood management policy in other policy domains. It is therefore crucial to now compare the internal aspects of the national FRGAs, because if sub-arrangements are dominant or connected together, it is also important to understand on which characteristics these arrangements are based. Sub-FRGAs will therefore be compared through the four dimensions of the Policy Arrangement Approach (actors, rules, discourses and resources).

4.4 A cross-country comparison of the internal aspects of the national FRGAs

Analysing the four dimensions of the Policy Arrangement Approach, the sub-FRGAs identified within the STAR-FLOOD countries show significant similarities and differences. Roughly speaking, a first line of distinction can be inductively drawn. On the one hand, several Flood Risk Management Strategies (namely defence, prevention and mitigation) are embedded in quite different governance arrangements (section 4.1.1). On the other hand, preparation and recovery are incorporated in governance arrangements that are similar in terms of actors, rules, resources and discourses (section 4.1.2).

4.4.1 Different governance arrangements organised around defence, prevention and mitigation

Table 4.1 Overview of the different sub-arrangements incorporating prevention, defence and mitigation

Sub-FRGA mainly dedicated to DEFENCE (sometimes MITIGATION) Pattern 1	Sub-FRGAs that are comparable on the following aspects : <ul style="list-style-type: none"> – centralised actors, although sometimes actors are at the local or basin scale (actors are often public but sometimes private) – technocratic discourse, although it is sometimes mixed with sustainability and climate change adaptation – technical rules (safety standards, ownership rights on defence infrastructures) – national resources, sometimes with local financing partnerships
Sub-FRGA mainly dedicated to PREVENTION and mitigation Pattern 2	Sub-FRGAs that are comparable according on the following aspects : <ul style="list-style-type: none"> – decentralised actors, sometimes with national supervisors (actors are often public but sometimes private) – discourse on sustainability, sometimes supplemented by a risk approach – rules on spatial planning (regulation by permit), sometimes with « water tests » – local resources, sometimes complemented by national resources or specific funds
Sub-FRGA based on balanced FRMS Pattern 3	Sub-FRGAs that are comparable on the following aspects : <ul style="list-style-type: none"> – decentralised actors linked to water management – discourses on sustainability and climate change adaptation – strategic rules that favour integrated water management or integrated FRM – resources based on partnership and decentralisation

A first pattern of sub-FRGAs can be inductively identified. It can be described as rather centralised and characterised by a technocratic approach and it embeds the flood defence strategy and in some cases the mitigation strategy.

All countries except Belgium illustrate this type of sub-FRGA: the Netherlands (Sub-FRGA for Water System Management), France (sub-FRGA for defence), Poland (sub-FRGA for defence), England (sub-FRGA for fluvial and coastal flood defence and mitigation) and Sweden (defence strategy). Although these sub-FRGAs are based mainly on defence in France and Poland, they are also partially based on preparation (Netherlands) (see figure 4.1).

The predominance of actors in charge of water management with a rather centralised approach should be noted. This is particularly the case for France (*sub-FRGA for defence*) and Poland (*sub-FRGA for defence*), where the state is the main actor for managing defences. In England, the Environment Agency (EA) is also the dominant actor. In these countries, the role of local authorities is not insignificant but power continues to be centralised. In the Netherlands and Sweden, the importance of decentralized actors is larger, but the central actors play a significant supervisory role. In the Netherlands, the main actors are the regional water boards, that is to say regional and – to a certain extent - national actors. In Sweden, the central administrative authority for environmental issues is responsible for regulatory guidance. Finally, all these sub-FRGAs illustrate the actual centralizing

trend of certain countries (France, Poland and to some extent England), and also show that in other countries (Netherlands, Sweden), despite their decentralized nature, central/regional authorities remain crucial. Overall, public participation in decision-making processes appears underdeveloped at the moment, except for the Netherlands.

Although public actors are dominant, it is worth noting that these sub-arrangements are also based on private actors and public-private partnerships, which are increasing (see chapter 5). In England, public and private actors (*e.g.* Water companies) have distinct responsibilities for different aspects of FRM. In all countries, important actors are riparian land or property owners who are required under the law to use their property or land in a way that does not increase the risk of flooding to a neighbouring property by changes in the water conditions. Several public-private partnerships have been identified for financing defence or mitigation projects. These partnerships include landowners (*e.g.* France).

From the perspective of the discourse, the underlying assumption is that nature could be controlled by mankind through technical measures. The importance of hydro-technical discourse is recognized in France, the Netherlands and Poland. However, a discourse directed to sustainability and adaptation to climate change has become significant in those three countries (see chapter 5). Sweden seems different in the fact that discourses seem to be fully directed to sustainability and climate change adaptation, while in England all of the above-mentioned discourses are attached to the sub-FRGA for defence/mitigation. Furthermore, with the exception of Poland, discourses tend to be favourable to decentralisation even in countries that are yet rather centralized (England, France).

What characterise this first type of sub-FRGA are also the rules of the game, which significantly reflect a risk approach. In most countries, different legal techniques are used to manage risks associated with defence and mitigation infrastructures (safety standards, licensing, assessment tools, building requirements, and technical guidelines). This approach is complemented by rules covering flood risk in relation to climate change in England, France and Sweden. In addition, in most countries, sub-FRGAs are based on integrated water legislation, especially in the Netherlands, while England has specific flood risk management legislation as well as cross-over with other policy domains and relevant legislation. It should be noted that most countries rely on a combination of public and private law (Netherlands, France, England), while other countries mostly rely on public law (Poland) or private law (Sweden). In consequence, these sub-FRGAs predominantly tend toward balanced governance between general interest and private interests.

Resources (financial, human and technological) broadly confirm the role of actors. First, the actors have (or need to have) important technical knowledge that stabilises their roles. This is the case for all countries except Poland, where a lack of competent experts is clearly recognised. For instance, in the Netherlands, the national and regional water authorities, together with a broad network of scientific institutes, including universities and consultancies, have a strong knowledge resource base in the field of engineering and water governance (OECD 2015). Second, centralised funding stabilises centralised actors, especially in France and Poland where defences are financed by general tax incomes. In the Netherlands, regional water authorities are supported by a relatively stable financial resource base due to their power to raise their own taxes for regional water management, including flood risk management. Regional water authorities have their own system of taxation (Van Rijswijk and Havekes 2012), and on the national level financial means are provided in special funds, the Delta Fund. However, in England, important changes have occurred in relation to funding defence and

mitigation projects. With the implementation of *Partnership Funding* in 2012, Grant-in-Aid (GiA) available through Defra is supported by funding sourced at the local level, via Local Authorities (see chapter 5).

From these four dimensions, we conclude that this type of governance arrangement, which exists in all countries except Belgium, is characterised by the dominant role of specialised and institutionalised public actors, although a trend can be witnessed towards a larger involvement of multiple actors, namely market and societal actors (see chapter 5). This first type of sub-FRGA also shows that multi-sector governance is noticeable especially at the discursive and legislative levels. Although the sub-FRGAs mentioned above are rather characterised by centralisation, it has been shown that FRM also occurs at smaller scales. This trend towards decentralisation is noticeable here but is also identified as a general trend in FRM that will be explained in chapter 5.

A second type of governance sub-arrangement is significantly based on spatial planning and decentralized governance, mainly incorporating the flood prevention and mitigation strategies (type 2).

The main aim of these sub-FRGAs is to minimise the exposure of property (and people) by prohibiting or discouraging development in areas susceptible to flooding. All countries except Belgium illustrate this type of sub-FRGA: the Netherlands (*Sub-FRGA for spatial planning*), France (*sub-FRGA for prevention*), Poland (*sub-FRGA for spatial planning*), England (*sub-FRGA for spatial planning*) and Sweden (*prevention strategy*). Although these sub-FRGAs are based mostly on prevention (France, The Netherlands), links are made to other FRMSs namely mitigation (England, The Netherlands) and defence (The Netherlands, England, and Poland).

From the point of view of the actors, decentralised governance clearly dominates. In the Netherlands, England and to some extent in Sweden, these sub-FRGAs are primarily embedded at local levels of government. With the decentralisation doctrine at its very heart, its main actors are to be found at the local level, where municipal authorities are responsible for establishing both strategic and normative spatial policy. In these three countries, it must nevertheless be noted that local institutions are required to be consistent with larger scale planning policy. Provincial and/or national authorities play a supervisory and (politically) steering role in spatial planning (eg England, The Netherlands). In France, the state supervision over local planning is much stronger. Therefore, formally, risk prevention rather belongs to centralised institutions but negotiations with local authorities are important. As for Poland, spatial planning formally belongs to municipalities. In all countries, decentralized authorities enable the development of public participation although significant disparities exist between countries.

From the perspective of the discourse, several aspects characterise this type of sub-FRGA. First, in all countries except Poland, discourses are linked to sustainability and climate change adaptation. Second, a discourse on localism and local decision-making is shared in several countries (England, The Netherlands, and Sweden). In France, there is an official discourse clearly oriented towards centralization as flood risk prevention is seen as a matter of national public safety. However, this discourse is also significantly open to negotiation and compromise with local authorities. In Poland, the sub-FRGA for spatial planning is rhetorically supported by all actors. Third, the Netherlands appears as the only country where spatial planning is closely connected to the paradigm of integrated water resource management.

This type of sub-FRGA is also characterized by comparable rules of the game. On the one hand, in England, the Netherlands and Sweden, legal rules confirm the division of powers between the actors. Although these sub-FRGAs are highly decentralized, supervisory authorities have some responsibilities. For instance, in the Netherlands, legally binding instructions can be given, and generally applicable norms can be established by provincial or state authorities. These instructions and norms are always directed towards Municipal Councils, and have to be directly implemented into their normative zoning plans. Similarly, in England, all planning documentation and decisions sit within the wider context of formal legislation surrounding (primarily) Town and Country Planning; however this is a more general legal requirement rather than specifically governing any flood elements. On the other hand, informal rules sometimes mitigate the division of powers between actors. In France, the state can formally impose its decisions on flood prevention, but informally, the strong negotiating capacity of municipalities makes possible local policies and therefore a *de facto* decentralization. In Poland, although municipalities are formally responsible for spatial planning, they have no real normative power. Dutch Water authorities do not play a formally decisive role in Dutch spatial planning, but – by virtue of the so-called water test – they do play a formalised advisory role during the process of drafting strategic and normative spatial policies. Besides that, it is worth noting that some countries implement specific tools related to integrated risk management/water resource (*i.e.* the sequential and exception tests in England, water test in the Netherlands). However, non-specific instruments are implemented in France (*e.g.* Impact study) while in Poland planning is characterized by instruments that have very few legal effects.

Local public actors (mainly authorities) are clearly predominant in all countries. Private actors are indeed less present than in the sub-arrangements presented above (see type 1), although the influence of planning applicants and developers is stressed in some cases. In England, France and Sweden, developers hold a relatively strong position and local planning is largely adapted to market demands. In addition, public participation seems stronger within those sub-arrangements as most of the FRM takes place at local level. There are important differences between countries because public participation is very developed locally in England while it is clearly underdeveloped in Poland. In all countries, public participation is formally organized but its effectiveness appears weak, except perhaps in England and the Netherlands (see Deliverable 5.2).

Confirming the characteristics of this group of sub-FRGAs, resources (financial, human and technological) largely depend on the local level. From a financial point of view, local resources dominate (England, Netherlands, Sweden). For instance, in the Netherlands, spatial planning only relies on Provincial and municipal funds, although in The Netherlands private parties can be held responsible for the financing of measures in the public interest such as flood protection. This can be arranged by both public law (spatial planning act) and private law. It can nevertheless be specified that financial resources are often the result of complex systems that also involve central authorities and private parties. As evidenced by France and England, some money is provided by the central government (*e.g.* local support grant services) and other sources of revenue come from the local level (*e.g.* local taxes). From a technical point of view, resources are shared with authorities which have a supervisory power. In England, technical support is provided by some national authorities (*e.g.* Environment Agency) through various instruments: National Planning Portal, Indicative flood map for planning, Modelling and mapping for flood risk assessment.

Several conclusions in terms of modes of governance can be drawn from these arrangements. Although FRM occurs at several levels, it is clearly geared towards decentralisation. The involvement of

private stakeholders is noticeable only in some countries and it seems relative. Also, public participation seems to be facilitated by the fact that these arrangements occur at the local level. This ongoing expansion to other actors will be explained in Chapter 5, while the effectiveness of public participation will be assessed in deliverable 5.2. Based on spatial planning, the arrangements described above also tend to favour multi-sector governance as the various planning instruments facilitate integration of different policies.

Arrangements identified country by country in the Work Package 3 invite us to present a third type of sub-FRGA. It is more integrative as it encompasses defence, mitigation and prevention in rather comprehensive policies on water management and sustainable development. This arrangement differs from the sub-FRGAs mentioned above and is mainly illustrated by Belgium, and to some extent in the Netherlands (*sub-FRGA for Urban Water management*) and in England (*sub-FRGA for Surface water management*).

Within these sub-FRGAs, actors belong to the water management policy or are closely related to it. Those actors are clearly decentralised. This is significantly the case in Belgium, where water managers are essential on several levels. For instance, in Flanders (*sub-FRGAs for Flemish Water System*), the Coordination Committee on Integrated Water Policy (CIW) assembles several water actors on different levels and it is now considered the principal actor for water policy-making. In Wallonia, River Contracts have been created at basin level in order to coordinate this wide range of flood managers. These local negotiation platforms are composed of representatives from municipalities, provinces, regional administration and local non-governmental organisations. In England, although the Environment Agency maintains a strategic overview of FRM for all types of flooding, responsibility for surface water management is assigned to Lead Local Flood Authorities (LLFAs). Under the Flood and Water Management Act 2010, LLFAs must integrate local flood risk, surface water, groundwater and fluvial flood risk posed by ordinary watercourses. In the Netherlands, the main actors within the sub-FRGA are landowners and municipal authorities.

These sub-arrangements seem to be enabling multi-actor governance but in different ways. In Belgium, because of the wide and inclusive character of both sub-arrangements (Wallonia and Flanders), numerous actors are involved in flood management. In Wallonia, river contracts have been created at basin level in order to coordinate this wide range of flood managers. In order to increase coordination within the highly fragmented actor structure, the DIWP established the Coordination Committee on Integrated Water Policy (CIW) in Flanders. However, all of these actors are mainly public and institutionalized. Public participation is rather low. By contrast, in England, the governance arrangements have a low degree of institutionalisation, which promotes the involvement of both public and private actors. Riparian owners have a significant influence on FRM in both countries (in the Netherlands, responsibility for flood safety in urban water management primarily lies with landowners), as do water companies and highway agencies in England, which stimulates public-private involvement or partnerships. In the Netherlands the governance arrangements of involving both public and private actors are formally and legally embedded.

Regarding discourses, they are mainly associated with sustainability and climate change. In Flanders and the Netherlands, the core of the official discourse is the three-step approach “capture, storage and drainage”. This discourse describes a more sustainable approach, which comprises ideas of a Sustainable Urban Drainage System (SuDS), which is also shared to some extent in England. Alongside this concept, two other terms are widely applied by water managers in Flanders and The

Netherlands, namely space for water and integrated water management. The latter concerns both the link between water quality and water quantity, the combination of different flood strategies and the coordination between different water managers. Most Walloon water managers follow a discourse of natural flood management, with attention being paid to dual benefits for water quality and biodiversity. Moreover, in England, sustainability, climate change and resilience are an important part in the discourses. The Netherlands, Flanders and Wallonia are also developing the concept of multi-layer water safety (MLWS) in favour of an integrated flood management policy. This argues for equal attention to flood prevention, protection and preparedness and for sharing responsibilities among actors active in these different domains.

From the perspective of the rules, they contribute to the consistency of the water management policy. Thus the main legal framework for FRM in the Flemish Region is provided for by the Decree on Integrated Water Policy (DIWP) and in The Netherlands in the integrated Water Act. Although legislative frameworks arising from other sectors also influence FRM (*e.g.* spatial planning), there are instruments or links that make those frameworks consistent with the water management policy (*eg.* water assessments). Concerning strategic planning, at present there are only two River Basin Management Plans in Flanders, which seem consequently more consistent and integrative. In Wallonia, the Water Code codifies the whole water regulation into one text. In this way, it adopts an integrated approach to water management, as both water quantity and water quality are included. Both the Water Framework Directive and the Floods Directive have also been implemented into the Walloon Water Code. The same system appears in The Netherlands: four river basin plans included in the National Water Plan, which deals with both water quality, water quantity and flood risk management. Apart from the Water Code, the spatial planning Code (the CWATUP) sets forth provisions relevant to FRM in Wallonia. Cartography also plays a central role in the Walloon Water System. It appears that in Wallonia, several instruments are used to integrate these different legal frameworks in favour of an integrated policy for flood management. The Plan PLUIES integrates all dimensions of the regional policy concerning floods. In addition, the Strategic Spatial Plan for the Walloon Region (SDER) maintains a focus on FRM, whereby the importance of spatial planning for FRM is recognised. Although England has an independent flood risk policy, this governance arrangement is also much integrated in the water management policy. In the Netherlands, the sub-FRGA represents an emerging way to manage flood risk which is based on water and environment management legislation, but which is nevertheless independent from the overall sub-arrangement for Water System Management.

From a point of view of the resources, however, the sub-FRGAs appear very different from country to country. Both in Flanders and Wallonia, flood risk measures in the Water System Arrangement are funded by general tax income. Some water managers in Belgium are allowed to collect additional resources. Overall, those water managers claim that their financial resources are insufficient to fulfil their missions both in Flanders and Wallonia. Notable differences are to be found in the Netherlands, where FRM for urban water management is based on municipal and provincial funds and a special tax which can be raised by municipalities. It is also different in England, where financial resources come from national funds (Flood and Coastal Erosion Risk Management Grant-in-Aid) via Partnership funding.

Type 3 sub-FRGAs shows us that a large range of FRMs and actors can be included in a single governance arrangement. Because they are quite integrative, the four dimensions of these sub-FRGAs (actors, rules, discourses and resources) show how multiple sectors (FRM, water

management, environment and climate change management) and actors (institutionalised or not) can be involved in governance arrangements (Table 4.2).

Conclusions

The 13 sub-arrangements analysed above show that, depending on the country, defence prevention and mitigation are implemented in quite different ways. This first series of sub-arrangements illustrates different modes of governance. In some cases, the range of actors, sectors and governance levels is large, while in other cases it is much restricted. The following section presents flood risk governance arrangements that appear more alike compared to those that have just been analysed.

4.4.2 Similar sub-FRGAs have formed around preparation and recovery

In all countries, similar sub-FRGAs have formed around preparation on one side and recovery on the other. Although significant differences remain between the STAR-FLOOD countries, those sub-FRGAs are similar in several aspects.

Table 4.2 Overview of sub-arrangements incorporating recovery and preparation

Sub-FRGAs based on preparation	<p>Sub-FRGAs that are comparable according to the following criteria :</p> <ul style="list-style-type: none"> – complementary actors : principle of subsidiarity (public actors, sometimes private) – discourse on public safety, evolving towards individual responsibility – rules on crisis management and civil contingencies – local resources, complemented by resources on a broader scale (subsidiarity)
Sub-FRGAs based on recovery	<p>Sub-FRGAs that are comparable according to the following criteria :</p> <ul style="list-style-type: none"> – insurance companies, sometimes with public supervisors (private actors but sometimes public) – discourse on individual responsibility, sometimes coupled with public solidarity – rules on insurance market, sometimes with specific public-private systems – private resources, sometimes complemented by public resources

Closely linked to the preparation strategy, the following sub-FRGAs can be compared: sub-FRGA for Emergency Management (Netherlands, Poland), sub-FRGA for preparation (France, Belgium), the strategy of preparation (Sweden) and sub-FRGA for Flood forecasting and warning as well as sub-FRGA for Flood Emergency management (England).

From the perspective of the actors, the principle of subsidiarity in the context of emergency management is common to most countries. This sub-FRGA is characterised by its strategic and planned approach of emergency situations, such as floods, and its tendency towards centralisation ('up-scaling' of responsibilities) of emergency management in case of severe floods. Indeed, emergency management is guided by the principle of *subsidiarity*, which advocates the devolution of decision making to the lowest appropriate scale, with collaboration and coordination at the highest level necessary (France, England, Netherlands, Sweden and Belgium). Ultimately, emergency management is under the authority of national authorities and governmental departments. Only in Poland has such a principle not been identified. Moreover, some countries rely more on the general population than others. In the Netherlands, and Sweden, crisis management seems to rely mainly on

public actors. In addition to designated professional actors, local action groups with citizen volunteers are used in France, England and The Netherlands. Poland is somehow in between as public actors dominate but voluntary fire brigades still play a significant role. In Belgium, groups of volunteers exist but citizens are uninvolved. With exception of the volunteers of the fire brigade and the Red Cross, Belgium does not have a tradition of community involvement in crisis management.

At the discursive level, it is widely accepted that public authorities have a duty of care in the name of public safety, especially in Poland. However, in other countries, a discursive emphasis is also placed on the self-reliance of populations, meaning that citizens are “responsible for their own safety” (France, Belgium and England to some extent). Going further, the Swedish system is mainly based on individual responsibility, which implies that individuals have the primary responsibility to protect themselves and their property. Besides, in the Netherlands and France, it is explicitly acknowledged that flood risks can at best be minimised, but can never be eliminated; this is in accordance with the integrated risk approach/integrated emergency management.

In terms of rules, most of the sub-FRGAs rely on crisis management and civil contingencies regulation. In all the countries, flood emergency management is embedded in a broader approach to emergency management in general. However, specific provisions for flood emergency management vary between the countries. In addition, all countries use emergency planning tools to organize preparation and response. Most often, there is a strategic planning (broader scale) and operational planning (smaller scales) that are implemented by different authorities (Netherlands, France, Belgium). In contrast, under Swedish law, individuals have the primary responsibility to take and finance the measures necessary to prevent the occurrence of an emergency and/or to mitigate the consequences of an emergency that has occurred.

Although other types of resources are crucial for the effectiveness of flood emergency management, from the point of view of resources, a principle of subsidiarity seems to be followed by most countries. Indeed, technical and financial resources seem to be provided by each public authority based on its scale of action in FRM. Sometimes a difficulty in implementation arises. In Belgium and France, it is often acknowledged that, for some small municipalities, the Flood Preparation Arrangement suffers from a lack of resources, in particular in terms of staff, more than other arrangements do. This is why, in the Netherlands, France, Belgium and Sweden, the sub-FRGAs rely on both municipal and national funds. Sources of financing appear larger and more complex in England. Indeed, unlike other countries, Poland depends on the technical and financial resources of the state, and partly of the European Union.

Mainly based on recovery, the following sub-FRGAs will be compared: sub-FRGA for compensation (Netherlands), sub-FRGA for recovery (France, Belgium), sub-FRGA for insurance and reinsurance (England), Sub-FRGA for Local Authority financial assistance and sub-FRGA for insurance and reinsurance (England), and the recovery strategy in Sweden. No sub-FRGA based on flood recovery has been identified in Poland. Overall, the main difference between these sub-FRGAs lies in the importance that is given to the general interest over private interests (Table 4.3).

From the perspective of the actors and rules, insurance companies are central in most countries except for the Netherlands, but sometimes public actors play a key role. None of the six countries is based on strictly public compensation sub-FRGAs. In England, insurance companies are hegemonic in the compensation of damage caused by flooding. The *insurance and reinsurance sub-FRGA* in England is firmly aligned with the strategy of recovery and is the primary mechanism by which individuals and

businesses are able to ensure financial assistance following flooding. From 2016 a not-for-profit reinsurance fund, Flood Re, will be introduced (see chapter 5). In contrast, France and Belgium are based on an insurance system with public financial compensation. This public-private hybrid system involves essential public actors. The Federal Ministry of Economy is the governmental actor which regulates the Belgian insurance system. In France, the public-private compensation system is controlled by an Inter-ministerial Committee at the national level. In these circumstances, France and England appear as quite contrasting models.

At the discursive level, countries vary depending on the importance given to individual responsibility versus public solidarity. In England, but also Sweden to some extent, the Individual responsibility for recovery and financial resilience dominates. Although public solidarity is the central voice in France and Belgium, it is nonetheless tempered. There is indeed a suggestion that public compensation would annihilate risk awareness. In both countries the discourses of the policy makers have been ranging between flood risk prevention (risk awareness-raising) and affordable flood insurance for everyone (solidarity). The discursive dimension of the sub-FRGA for compensation in the Netherlands does not seem to be developed.

Regarding modes of governance, it is also the division between the public sphere and the private sphere which is the main distinction between countries. Two countries can be brought together on this point. Indeed, in France, the compensation scheme embodies the solidarity principle and it is based on an original collaboration between the insurance market and the State. In England, flood insurance has always been operated purely on a market basis. However, in England, the proposal for a new scheme suggests a higher degree of government involvement and regulation, indicating a potential shift in the distribution of power between the State and the market (see chapter 5).

With the examination of these 27 sub-FRGAs (section 4.3.1 and 4.3.2), we have presented how the actors, rules, resources and discourses on flood risk management could somehow form stabilised constellations (sub-FRGAs). These different sub-arrangements reflect different modes of governance. It was shown how these arrangements enable or constrain multi-actor, multi-sector and multi-level governance.

4.5 Conclusions

Flood Risk Management Strategies in all countries are embedded in overall flood risk governance arrangements. These consist of the actors and actor constellations involved in all policy domains related to flood risk management – including water management, spatial planning and disaster management – their formal and informal rules of the game, their policy discourses and the power and resource base of the actors involved. Through this chapter we asked ourselves what were the similarities and differences observed in the six countries in terms of Flood Risk Governance Arrangements and what were the main institutional patterns of FRGAs and to what extent do they differ country per country?

Cross-country analysis reveals a number of similarities as well as differences in the structure of national flood risk governance arrangements in the STAR-FLOOD countries. Whereas some countries display multiple sub-arrangements (e.g. England, France), others are characterised by fewer and larger sub-FRGAs (Netherlands, Belgium and Poland). Concerning how strategies are embedded within the national arrangement, some strategies are governed within one distinct sub-arrangement, others overlap multiple sub-arrangements. This can be expected to have an effect on how different

countries react to external influences and how flexible they are in deliberately changing FRM approaches.

After having compared first the overall governance structure of STAR-FLOOD countries (*i.e.* flood risk governance arrangements), and then the internal aspects of each national flood risk governance arrangement (*i.e.* sub-arrangements), we can draw three models that highlight the differences and similarities between countries:

- First, England, Belgium, and Sweden to some extent have significant similarities. Sub-arrangements are highly balanced in the sense that they do not differ significantly in terms of their power basis. This seems to have facilitated diversification of flood risk management strategies but also necessitated the involvement of effective linkage between strategies to avoid fragmentation. The whole English flood management system relies upon a large number of sub-arrangements, which involve numerous actors, different resources, discourses and levels of governance. These multiple sub arrangements, which have very specific goals, partially relate to a flood policy domain but also to other policy fields. But at the same time, the large number of bridging mechanisms makes the whole flood risk management highly integrative and interconnected. Although the system appears to be scattered between many sub-arrangements, the level of cooperation between actors, the legal instruments or the informal bridging processes push the English case towards an integrative approach. From this point of view, Belgium resembles England, with a fairly balanced and integrative system especially with sub-arrangements that include multiple strategies simultaneously. The federal structure of the country, however, led to some points of imbalances or fragmentation.
- Second, the Netherlands can be seen as unique because the sub-arrangements are very unbalanced in the sense that there are less sub-arrangements and that the sub-arrangement related to the flood defence strategy – the water management sub-arrangement – clearly has a much higher power basis than all the other sub-arrangements. This sub-arrangement favours public actors. The dominance of this sub-arrangement also leads to a rather independent flood risk management policy. However, the water system management sub-arrangement, as already explained, by its size and importance has the power to promote diversification of strategies on its own. Although it is still the defence strategy that is predominant, preparation and prevention are also mobilised within the sub arrangement. The only strategy that seems to be underdeveloped is the recovery strategy. We found that the dominant sub-arrangement is currently opening itself to other strategies than defence in order to keep its legitimacy and therefore, its overpowering position, less so being challenged by other sub-arrangements.
- Third, France and Poland differ from the two constellations presented above because sub-arrangements there are neither completely unbalanced nor completely balanced. The dominating sub-arrangements of water system management in the Flanders and Walloon regions in Belgium and the defence arrangement in France lead to a rather narrow scope of actors involved and to an independent flood risk management policy. In these cases, the number of bridging mechanism seems to be quite low or ineffective. Although some linkage exists between strategies, the system cannot be defined as highly integrative.

The three models mentioned above lead to an important conclusion in terms of multi-sector governance. It appears that in all cases bridging mechanisms are crucial, however, the reason why differs. In case of an unbalanced FRGA with a dominant sub-FRGA, it needs to open itself to other

sub-FRGAs to maintain legitimacy. In case of a more balanced FRGA like in England, bridging mechanisms are needed to overcome inefficiencies and trade-offs between the large number of sub-FRGAs.

Paradoxically, strong features of some sub-arrangements can indirectly cause weaknesses in other sub-arrangements. A strong involvement of government can lead to a reduced involvement of other parties (business and citizens) and reduced risk awareness. Also, a strong recovery system with a developed insurance scheme can lead to reduced societal preparation measures and increased risk taking (moral hazard), etc.

5 Explaining the dynamics in Flood Risk Governance in six European countries

5.1 Introduction

In the previous chapters we discussed the diversity and dominance of flood risk management strategies (chapter 2), the bridging mechanisms or connections (in chapter 3) and described the features of flood risk governance arrangements and sub-arrangements (FRGAs, chapter 4). We will now give **explanations** for both the diversity and dominance of these flood risk strategies in the six countries and for the dynamics in the underlying governance arrangements in terms of stability and change.

The central question of this chapter is therefore:

What factors are responsible for stability and change in arrangements, and what are mechanisms of stability and change?

In order to connect the different chapters and to be able to answer this question, we consider *flood risk management strategies* as the practical and visible *outcomes* of (non)decisions made in the domestic *flood risk governance arrangement* as a whole (FRGA) and its sub-arrangements (sub-FRGAs) (see conceptual model in Figure 1.2).

To further structure the analysis of flood risk governance, and to make it both comprehensive and understandable, we give explanations for four elements of flood risk governance in this chapter (*explanandum*):

1. The *initial* diversity and dominance of flood risk governance arrangements;
2. The process of diversification: *possible changes* in diversity and dominance of these arrangements;
3. The way flood risk management is *initially organised* in a country, further structured in multi-sector, multi-actor, and multi-level governance;
4. *Possible changes* in the way flood risk management is organised in multi-sector, multi-actor and multi-level governance.

In addition to the previously introduced analysis in terms of diversity and dominance of FRGAs we employ the concepts of multi-sector, multi-actor and multi-level governance. We used these ‘triple–multis’ before in the analysis of dynamics in water management (Wiering & Crabbé, 2006; Liefferink, Wiering & Uitenboogaart, 2011) and it relates well to the key characteristics of flood risk governance in chapter 4. **We have chosen to structure this chapter this way in order to sketch the core characteristics of flood risk governance in the six countries.** This enables us to summarise the comparisons of the preceding chapters (on strategies and arrangements), to compare the countries in their core governance features, while still making a comprehensive analysis covering all four dimensions of the Policy Arrangements Approach (PAA) possible.

What explains all these characteristics of and developments in flood risk governance in the six countries, in other words, what is the *explanans*? In textbox 5.1 and the conceptual model in Figure 5.1 we have further detailed the most important explanatory factors in the following categories:

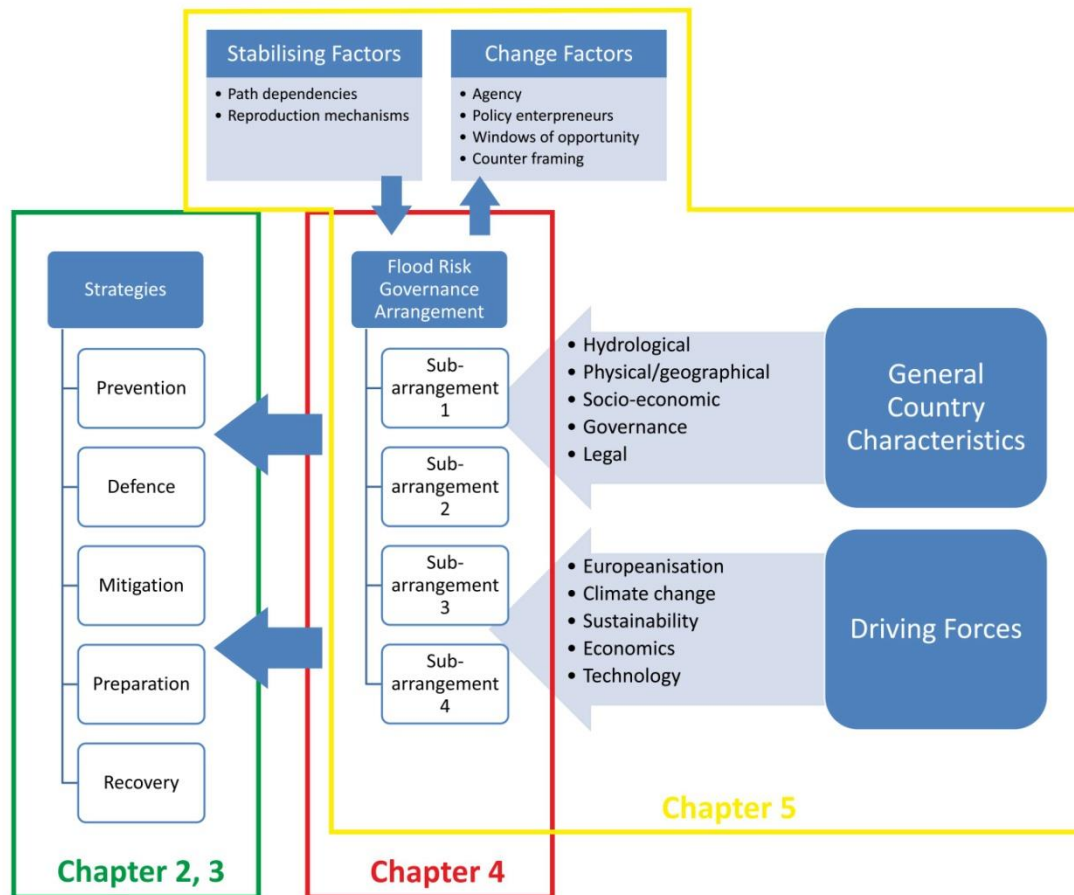


Figure 5.1 Conceptual Model of this report

If we take a closer look at the conceptual model above, reading it from right to left, there are four categories that could explain stability and change: A) general country characteristics; B) specific driving forces; C) stabilising factors within arrangements and D) change factors within arrangements. A and B can be considered as factors outside of the flood risk governance arrangement, C and D are factors inside flood risk governance arrangements.

These categories have been defined both deductively and inductively. They are factors that are mentioned both in the literature and are referred to in the elaborate country reports of the six countries. Here, the most important explanatory factors are further elaborated in light of a comparison of the six countries (Box 5.1).

Box 5.1 Relevant indicators explaining both general characteristics, as well as stability and change, of flood risk governance (FRG)

(A) Country characteristics:

- Hydrological characteristics (*e.g.* nature of floods, flash floods, precipitation)
- Physical / geographical characteristics (*e.g.* low lying delta, vulnerability, diverse landscapes)
- Social-economic characteristics (wealth, plenty of resources, structural lack of resources)
- Governance characteristics (political systems in general; statist/neo-liberal/neo-corporatist/consensual, etc.)
- Legal characteristics (legal systems)

(B) Driving forces:

- Europeanisation – *e.g.* Water Framework Directive and Floods Directive
- Climate Change
- Sustainability / ecological turn
- Economics/ economic rationalisations
- Technology

(C) Stabilising factors in existing flood risk governance arrangements

(*e.g.* path dependencies, reproduction mechanisms, legal fixations, constitutional procedures, etc.)

(D) Change factors in existing flood risk governance arrangements

(*e.g.* policy entrepreneurs, new actor coalitions, newly design rules, new discourses, new knowledge, changes in epistemic or expert communities, etc.)

Next to the (A) country characteristics, we defined five important external factors that have high relevance for flood policies in Europe, which we call ‘driving forces’ (B). We consider (a) Europeanisation, (b) climate change, (c) sustainability, (d) economics and (e) technology as crucial driving forces that can “disturb” the domestic system of flood risk governance. These driving forces, such as the impact of European Directives or climate change, do not change the variety of flood risk strategies straightforwardly. Instead, they are mediated by stabilising (C) and changing factors (D) within FRGAs (see Figure 1.2.), where there are internal forces that might lead to stabilisation of policies and their outcomes (strategies) and forces that might lead to change, *e.g.* to alter the set of arrangements and strategies. A stabilising internal factor could be strong path dependencies of flood risk experts or legal ‘fixations’; a change agent might be a policy entrepreneur ‘riding the wave of climate change’ to create more nature-friendly flood plains or to introduce an insurance system where there is not one in place yet.

The challenge, in our view, is to combine the explanatory factors and the endogenous elements of the FRGAs in a convincing way, based on the rich empirical data in the country reports and other outcomes of the STAR-FLOOD project. However, for the descriptions that follow in this chapter we chose not to use the conceptual model and its explanatory factors (Box 5.1) as an overly mechanistic tool, but rather as a heuristic device to come to sensible conclusions. We describe certain characteristics of flood risk governance in all investigated countries and apply the explanatory factors of Box 5.1 and the conceptual model more ‘loosely’.

Connecting to preceding chapters, we first try to explain the diversity and dominance of arrangements and strategies, and then explain (shifts in) multi-sector, multi-actor and multi-level governance.

The key question for section 5.2 is: Why is there dominance of some strategies and arrangements in some countries and not in others? What factors explain further diversification of flood risk governance arrangements? This connects strongly to chapters 3 and 4 on fragmentation and balance of strategies and arrangements. In section 5.3, on *multi-sector governance*, we discuss the factors that explain why flood risk governance either has more differentiated structures, such as sector-based water management, or relies on integrated planning – or even integrated risk management –

and what are the possible changes therein? *Multi-actor governance* (section 5.4) concerns factors that explain why flood risk governance is a responsibility of the state, the market and/or civil society, their interrelationships, and possible changes therein. In section 5.5 on *multi-level governance* we analyse the factors that explain why flood risk governance is organised locally, regionally, or nationally, what possible shifts in (de)centralisation we see, and how we can explain them. Finally, we end with overall reflections: which explanatory factors stand out in a comparative perspective, *i.e.* how do these driving forces “impact on countries differently” as seen from a more comprehensive and integrated view of the six countries? A summary of the key findings from sections 5.2 to 5.5 is presented in table 5.1.

Table 5.1 Key findings for the STAR-FLOOD countries

Characteristics of FRGAs	Belgium	England	France	The Netherlands	Poland	Sweden
Diversification on Dominance/	Moderately diversified, defence still important	Highly diversified, quite balanced	Moderately diversified, defence still important	Low diversification, defence dominant	Low diversification, defence dominant	No specific public arrangement, focus on preparation
Multi-Sector	Water sector and spatial planning gaining equal importance; water sector still important	Multi-sector involvement & integrated by spatial planning	Water sector and spatial planning equally important	Water sector dominant	Water sector dominant	Multi-sector involvement, but not integrated
Multi-Actor	Public (state dominant)	Public & private	Public (state dominant)	Public (state dominant)	Public (state dominant)	Public & private
Multi-Level	Decentralised, tendency towards centralisation	Central and local level	Central, towards decentralisation	Both central and regional level	Central, towards the regional level	Decentralised, local level

5.2 Dominance and diversification of FRGAs

The previous chapter (4) presented varying numbers of sub-FRGAs in the six countries and showed countries characterised by a more balanced configuration and countries with one or two dominant arrangements. The *key questions* for this section are: Why is there dominance of some strategies and arrangements in some countries and not in others? What factors explain further diversification of flood risk governance arrangements?

First of all, to explain these differences the hydro-physical characteristics and historical developments in governance style play an important role. England has a variety of sub-arrangements and all strategies are included. Sweden has no independent FRGA, and the Netherlands has different sub-arrangements and strategies but with a strong dominance of flood defence. This is further explained in Box 5.2.

Box 5.2 Diversification of strategies and arrangements

England represents one extreme of the spectrum. It has the **highest number of sub-FRGAs** and they are relatively balanced. There are several explanations. Initially, the hydro-physical country characteristics are influential: England traditionally faces a broad number of flood types (pluvial, fluvial and coastal threats are considered equally important). These different types of flood ask for specific management approaches and strategies. Furthermore, there is no straightforward legal responsibility of the national government to protect its people from flood risks. This is why different parties, public and private, central and local, are very much involved.

The Netherlands, on the other hand, has a variety of arrangements but is **much less balanced**, with the water system management arrangement being very dominant. In the Netherlands we see a combination of extremely high vulnerability to floods, mostly coastal and fluvial, a history of flood events, and a historically evolved state responsibility which is institutionalised in a specific sector-based and strong water system sub-FRGA. The government has a legal responsibility for flood risk safety by way of national flood risk standards.

In Sweden, there is **no specific or independent flood risk governance arrangement** at all. In fact, the issue of flooding is scattered across different policy areas. This can be explained by the low problem pressure: until recently, flooding was **only a localised, relatively minor problem. Under the banner of climate change it is slowly gaining in national importance**. The governance style in Sweden also gives municipalities a high degree of autonomy. This combination, *i.e.*, limited and localised problems and local governance, hampers the development of a comprehensive, national FRGA.

In Poland, France and Belgium the number of sub-FRGAs is somewhere in between extremes. We see that in these three countries the sub-FRGAs responsible for flood defence have also traditionally been very dominant, partly until today. This is because flood risks in these countries are considered severe, triggered by flood shock events which still function as reference traumas legitimising the traditional approaches. Furthermore, there has been a dominance of technical expertise since the 19th century. This expertise enabled the state to maintain its legitimacy by being the provider of security and safety (*e.g.* France: Jacobinism, Netherlands: provide habitability, Poland: omnipotent communist state)¹. Historically, the areas protected from flooding through dikes were often the areas where, subsequently, high economic development took place. This means that risks increased, which demanded increased (or at least continuous) protection.

5.2.1 Driving forces regarding dominance and diversification*Flood risk and sustainability discourses*

One recurring factor driving change is a discursive shift away from a purely technocratic view of FRM. Examples of rising alternative discourses include safety or risk-based discourses (*e.g.* France, Sweden, the Netherlands), integrated flood risk management and eco-system based management (*e.g.* France, Belgium, The Netherlands), climate change (*e.g.* Sweden), and environment or sustainable development (*e.g.* Sweden, the Netherlands, Poland). These discourses challenge the traditional

¹ This is also the case for England, however, as explained in Box 5.2, other factors were more influential.

technocratic view, and can lead to an increasing diversification of arrangements (*e.g.* the traditionally strong role of prevention in France, or the ‘making space for water’ discourse in the Netherlands and Belgium strengthening prevention). However, such discourses have varying effects: the climate change debate led to increased attention to FRM and mitigation in Sweden, yet has had little visible impact in Poland, and largely maintained the defence dominance in the Netherlands.

Technology

Another factor that can pave the way for increased diversification is technological development. The constant improvements in flood risk modelling, monitoring and forecasting provide more opportunities to incorporate flood risk in other arrangements (*e.g.* improvements in flood risk mapping in England, The Netherlands and Belgium allowing spatial planners to better assess flood risk in their territories).

Europeanisation

Europeanisation has had a mixed influence on diversification and dominance in FRM. In some countries (*e.g.* the Netherlands), EU directives like the Floods Directive were implemented along the lines of the existing defence-oriented approach, though with a stimulus to speed up implementation of the risk approach in legislation, and as such did little to challenge the defence dominance. In other countries (*e.g.* Belgium), EU directives and participation in EU research projects did stimulate increased attention to new approaches to FRM, such as risk-based management and nature-based approaches. Europeanisation can also drive both dominance and diversification within the same country: in Poland, access to EU funds strengthened the focus on defence, but EU directives also introduced or strengthened flood risk mapping and nature-based approaches, in turn reinforcing the position of environmental NGOs.

Factors of change

As we have stated before, there is no direct relationship between a driving force and the direction of change in arrangements or strategies. The above-mentioned driving forces often bring in new ideas and concepts, thus primarily influencing the discourses of FRGAs, yet are not always accompanied by concomitant changes in resources and/or rules. Mitigation in France and Poland is currently still largely found as a discourse rather than a concrete practice.

Whether a new discourse leads to (real) policy change is often dependent on the role of the active framing of actors and the strength of policy entrepreneurs. In several countries we witness framing contests (Boin, 't Hart & McConnell, 2009) between those using a ‘status quo’ technocratic discourse and change agents aiming to frame flood risk or specific events as a signal for the need for diversification of strategies.

Box 5.3 Framing contest after events

After the millennium flood of 1997, the Polish government was blamed for its inability to provide safety because of inadequate technical flood defence infrastructure. This mobilised the need for a reduced dependence on defence, which eventually led to more emphasis on preparation.

Examples are also to be found with policy entrepreneurs in Belgium or the mid-term response to the 1993/1995 flood events in the Netherlands, which created space for ‘Room for the river’

The outcome of these framing contests can point in different directions; flood events can lead to increasing diversification in some cases (*e.g.* the 1997 flood in Poland leading to strengthening of

preparation next to defence; see Box 5.3) but not in others (e.g. some shock events in France further legitimizing the emphasis on prevention).

Factors of stability

Path dependency as stabilising factor

We see that in all countries the past investments in structural defence infrastructure are described as stabilising forces. High financial investment in flood infrastructure – with its created flood risk expertise in epistemic communities - leads to increasing returns and so-called ‘sunk costs’. This reduces the practical possibilities to implement alternative measures (e.g. Poland, France, the Netherlands) and might make further investments in dikes the most cost-efficient solution (e.g. the Netherlands). In nearly all countries, established institutions and regulations are identified as stabilising and as contributing to classical forms of path dependency, affecting all four dimensions of a policy arrangement. The incentive to change regulations (rules) tends to be limited due to high transaction costs when changing administrative arrangements and developing new expertise and infrastructure (resources); see Box 5.4. In addition, particular actors with explicit responsibility for flood protection may have interests in keeping their power positions (e.g. the Netherlands, France) and maintaining the status quo, including a lack of awareness among citizens and non-water governmental authorities, which is the case in the Netherlands, Belgium, France, and Poland. In contrast, England is characterised by a relatively high degree of policy freedom and a higher degree of awareness among spatial planners. This combination enables bottom-up initiatives and a higher degree of diversification.

Diversification is also hampered by conflicting interests. As one example, combining defence and prevention can be difficult to realize when defence measures enjoy much greater political legitimacy (e.g. Poland, France, the Netherlands), because people are often more familiar with it, while prevention measures often have to compete with other interests such as existing land use, private property rights, urban development and economic growth (e.g. Poland, Sweden, The Netherlands). It is then much easier to prolong the separation of land use and water, leading to further maintenance and dominance of defence. Neglect of prevention measures, however, can end up being a driver of change in itself, as we saw with the increasing recognition of a ‘spatial planning backlog’ in Belgium.

Stability through fragmentation

A strong focus on technical expertise and investments in infrastructure leads to stabilisation of arrangements. However, even within stable arrangements changes can occur because of learning and adaptive management. Cooperation and the exchange of ideas is hampered in situations where there is high fragmentation of responsibilities and competencies (e.g. Belgium, Poland, France). This fragmentation is often increased by particular administrative characteristics, like the federal system in Belgium or the strong distinction between central and decentralised levels in France.

5.3 Change in multi-sector governance

The key question regarding multi-sector governance is: What factors explain how flood risk governance is organised in terms of integration or separation of specific sectors, and how is this evolving? In other words: why do some countries have a fully separated domain of water management, while others rely on integrated planning systems or other generic policy systems? What influence do more integrative discourses and frames such as integrated water resources

management or river basin management have on flood risk governance? Some refer to this discussion as the sector-facet discussion, in which sector management tends to focus on its own sector-specific interests and expertise while integrated planning has an eye for different facets of a governance problem. A related element – and clearly dependent on the first – of multi-sector governance is the way the coordination of neighbouring policies (*e.g.* industry, agriculture, nature conservation, mobility) with water management is organised, including the separation or integration of, and cementing and bridging mechanisms between, arrangements and strategies as discussed in chapters 3 and 4.

Box 5.4 Sector-based management in the Netherlands

Some countries have chosen to create strong water organisations that are fully sector-based. The Netherlands has strong task-specific regional water authorities (water boards) and Rijkswaterstaat as an important national functional water agency. The Netherlands has separate water-sector based financial resources (taxes), has separate water-bound legal structures (integrated water regulation), etc. There is even a separate climate adaptation program that mostly invests in flood risk management.

We see differences in the way countries rely on a separate sector domain of water management, or on spatial planning - or even risk management - as a generic governmental coordination mechanism. Very often this is related to historically defined preferences for specific levels of governance, *e.g.* preferences for generic local or national level governance, as well as the *strength* of spatial planning or risk management as a coordinating mechanism.

Evidently, in all the countries we find spatial planning and some specific water management governance institutions co-existing, perhaps with the exception of Sweden where there are hardly any institutions specific to FRM. In Sweden, water management is left almost entirely up to generic local risk management and local planning. In England and France spatial planning plays an important role, *e.g.* in zoning plans or mitigation strategies. Poland is, second after the Dutch, most oriented towards sector-based organisations. Finally, in Belgium we have a bit of both: water management bodies hold a dominant position within FRM, but - within the period of our research - the use of spatial planning instruments has increased significantly within the framework of integrated water management, particularly in the Flemish region. The same development, at least discursively, can be seen in the Netherlands.

Driving forces

Sustainability, climate change and Europeanisation as driving forces

There are specific integrative discursive concepts that have an impact on preferences in multi-sector governance, *e.g.* integrated water resources management (IWRM; Savenije & Van der Zaag, 2008), (eco)system-based management, river basin management (as in the WFD) or even resilience and “risk” as an integrative discourse (Meijerink and Dicke, 2008; Rothstein *et al.*, 2013). But sometimes these integrative discourses strengthen the water sector institutions instead of integrated planning. How does this work?

In general, sustainability and ecosystem-based management have been very important for the course of flood risk management (Warner, van Buuren, & Edelenbos, 2013). These new discourses increase

the legitimacy of additional or alternative strategies. In the context of IWRM attention has increasingly shifted towards both the environment and nature conservation, which has increased the possibilities for nature-friendly and spatially integrated flood risk measures such as Making Space for Water in England and the spatial-environmental discourse included in Room for the River (*e.g.* the Netherlands, Belgium, Poland, France). This is further strengthened by the EU Water Framework Directive, with its river basin planning and its ecological perspective on water management. In the Netherlands, France, Poland and Belgium, the WFD reinforced the shift towards more integration of environmental policies in flooding, because it legitimized actors advocating environmental interests. Also in Sweden sustainability is a driving discourse that encourages the integration of flood issues in spatial planning and risk management.

Finally, the concept of ‘resilience’ itself often promotes community involvement in risk strategies, as seen in England. The Floods Directive also conveys specific ideas on flood risk diversity and the need for flood risk communication. In the Netherlands and Belgium, the Floods Directive and the emphasis on resilience asks for a broadening of strategies; for example, in the Netherlands, risk communication is still a problematic issue because it does not connect well to the idea of a government that will take care of its citizens.

Technology as driving force

An important precondition for the integration of flooding in different policies, *e.g.* spatial planning, environment or emergency management, is the advance in technology. Better processor capacities of computers allow improved modelling, forecasting and eventually assessment and mapping of flood risk. This further facilitates the integration of spatial planning and emergency management in all the STAR-FLOOD countries.

Factors of change

Sectoral alliances

A central (and obvious) multi-sector feature of flood risk governance is the level and nature of coordination of water management with its adjacent policies (industry, agriculture, nature conservation, mobility). In most countries water management has historically facilitated on the one hand rural development and agriculture, and on the other hand (urban) industrial activity and housing by creating clear dividing lines between water and land use. But over decades we have seen this changing: the alliance between water and agriculture has gradually been replaced by other alliances.

In the Netherlands we have seen a shift towards a nature alliance in the course of the IWRM discourse, which led to “Room for the River” and many ecological restoration projects in smaller water bodies combining ecological goals and increases in retention capacity (Moss & Monstadt, 2007). Similar trends are visible in Poland (Odra 2000), Belgium (integrated water policy, providing space for water), England (Making Space for water) and France (*L’espace de la rivière*). Besides these *new alliances* of water and nature, we also see an increased coordination with spatial planning, such as the water assessment (Belgium and the Netherlands) and PAPI (Action Programme for Flood Prevention) in France. In Poland, however, the integration of spatial planning and water management is only marginally developed and bridging mechanisms are missing.

In most STAR-FLOOD countries the strategy of flood preparation is embedded in broader arrangements around emergency management or contingency planning (*e.g.* France, England,

Sweden, Poland). We do, however, see new bridging mechanisms between water or spatial planning arrangements and emergency management, such as the Steering Group Management Flooding in the Netherlands. In some countries, however, emergency management remains relatively isolated (*e.g.* France) or the integration is stronger on paper than in practice (*e.g.* the use of flood risk maps in spatial planning in Poland). Finally, some countries (*e.g.* Belgium) build bridges between recovery and spatial planning arrangements, using insurance premiums to reduce incentives to build in flood-prone areas.

Agency as change factors

We see that specific actors or organisations strive for change related to multi-sector governance, as well as for stabilising a certain dominance of a policy sector. Policy entrepreneurs lobbying for the integration of flood issues in other policy domains can be found in all STAR-FLOOD countries. In England, the insurance industry has lobbied for better consideration of flood risk in spatial planning, whereas in the Netherlands and Belgium – at the regional level at least - water managers acted as policy entrepreneurs and advocated increased integration of flood risk in spatial planning or emergency management. Sometimes floods are triggers to multi-sector integration.

Factors of stability

While in some cases concepts of resilience and a broader risk approach lead to enforcement of the role of generic and more integrative instruments such as spatial planning, in others this integrative multi-sector shift is limited. While the Netherlands has a strong discourse on integrated water management, flood risk safety has a separate status as a vital public interest. In Sweden and Poland we witness other stabilising factors, as integration of flooding and spatial planning at the local level conflicts with interests in urban expansion. In several countries (*e.g.* France) we witness water engineers lobbying for a water-sector dominant approach. The strict legal responsibilities of water managers also make it more difficult to communicate between actors and share coordination in a more integrated manner (*e.g.* Poland, Belgium).

5.4 Change in multi-actor governance

In each investigated country a certain trend can be witnessed towards greater involvement of market and civil society actors in FRM. This can range from enhanced participatory processes to more comprehensive forms of co-production (*i.e.* participation in both decision-making and delivery) of policies (see Box 5.5). In all investigated countries, citizens and market actors are increasingly involved in FRM, but the intensity and form of co-production differs significantly. What are the driving forces, as well as the changing and stabilising factors, behind the various expressions of this trend in our six countries?

Box 5.5 Multi-actor governance in the STAR-FLOOD countries

The co-production of flood risk management between state and society is strongest in England. Here, far-reaching cooperation exists between residents of flood-prone areas and authorities, both in the decision-making phase and in implementation of flood risk measures, *e.g.* through community flood action groups. In addition, market actors play an important role due to the privatisation of the water sector and high market penetration of flood insurance. In France, public participation remains limited but flood and other risks became legally institutionalised as a citizen's responsibility in 2004. In the Netherlands, the government is attempting to raise the flood awareness of the Dutch population to encourage appropriate behaviour, and innovative examples of public participation in FRM decision-

making can be found. In Flanders (Belgium), a discourse on sharing flood risk responsibilities with societal actors is emergent. Collective stakeholder participation is taking place through the river contracts in the Walloon region of Belgium. In 2006, the insurance sector also entered the domain of FRM. Citizen involvement in decision-making and implementation is hardly encouraged by the authorities in Poland, but bottom-up initiatives are being taken in the field of flood preparation. In Sweden, public consultations are organised as required by law, but the interest of citizens in participating, and the impact of these events, appears to be limited. Hydropower companies are important private actors in Swedish FRM.

Driving forces

Three major driving forces behind the trend towards increasing citizen and market involvement in FRM can be distinguished: (1) a general shift to a more open and equal relationship between state, market and society, *i.e.* the shift from government to governance; (2) a shift from flood control towards a risk-based approach of floods; and (3) the development of information technology.

General trend towards governance

The trend of increasing citizen and market involvement is not unique to the field of FRM. A tendency towards enhanced participation and co-production can also be witnessed in other sectors (Bulkeley & Mol, 2003; Needham, 2007; Fotaki, 2011). It is claimed that a shift has taken place from government to governance, whereby the state is only one steering actor amongst others (Driessen *et al.*, 2012).

In the field of FRM, Europeanisation plays a significant role in this process. An important legislative step in the evolution towards enhanced participation has been the UN Aarhus Convention of 1998 which established the right of individuals and their associations to have access to environmental information and participate in environmental decision-making. Closely related to this, EU directives such as the EIA directive and the WFD oblige member states to involve the public in FRM decision-making. Particularly in Poland the increase of public participation is directly influenced by EU legislation and investments. In order to receive EU funding, FRM projects are required to involve individuals and NGOs in the planning process.

Towards flood risk management

Secondly, the co-production of FRM is influenced by a discursive shift from flood control towards a risk-based approach to floods. Public authorities increasingly seek to handle flood risks not only through structural protection works, but also by way of prevention, preparation and recovery measures. This diversification necessitates the involvement of new actors, including other governmental departments (*e.g.* spatial planning) but in some cases also market actors or citizens (Mees *et al.*, 2014).

The shift towards a risk-based approach is connected to a change in the character and perception of flood risks themselves. Due to a combination of climate change and urbanisation trends, flood damages have increased over the past decades. In order to increase the resilience of society against flooding, it is increasingly considered necessary that a wider range of actors behave appropriately in the prevention of, preparation for, and response to flooding. While flood management in the past relied heavily on technocratic engineering expertise, strategies such as prevention, mitigation and preparation allow for – and in fact require – new types of knowledge to enter the decision-making process.

Technological advancement

The development of information technologies has facilitated the involvement of citizens in FRM. Due to advancements in technologies such as flood warning systems and flood cartography, it is now easier to raise flood awareness and foster appropriate citizen behaviour. Thanks to detailed online flood maps, prospective buyers can more easily check whether a property is flood-prone or not. Raising awareness this way also extends to emergency management: for example, in several STAR-FLOOD countries (*e.g.* Belgium, the Netherlands) text messaging is used to alert citizens during a flood event. Also when it comes to public participation in the decision-making process, the online distribution and collection of information facilitates the involvement of a wider range of actors.

Factors of change*Cost-effectiveness concerns*

In addition to these driving forces, the trend towards increasing market and citizen involvement in FRM is supported by economic concerns related to cost-effectiveness. In many countries more emphasis is put today on cost-effectiveness, or efficiency, than previously. Again, this trend can be associated with an expected rise in the costs of floods due to climate change and societal trends, such as urbanisation and the increased use of floodplains. Furthermore, cost-effectiveness concerns are embedded in a wider discourse of ‘economic sustainability’ and a neoliberal approach to government. In countries such as England, Sweden, France, Flanders (Belgium) and the Netherlands, this discourse has led to a redefinition of the division between public and private services (Rose, 2000; Fotaki, 2011). Governments increasingly expect a mutual effort from citizens in achieving socially desirable goals.

This also relates to the increased attention to public participation, which in England is linked to a discourse on ‘localism’ (see section 6.5). With their plea for the ‘new local’, policymakers in England aim to increase policy efficiency and effectiveness, as well as encourage wide participation (Begg *et al.*, 2015).

Factors of stability

Tendencies towards governance, the increasing importance of risk-based approaches and cost-effectiveness as well as technological developments can be found in all countries studied. Why do these countries nevertheless show remarkable differences in the extent to which they include market actors and citizens into their management of flood risks?

Differences in country characteristics

An important factor is the size and character of potential flood damages. These diverge largely among the countries of our research. With 21% of its territory below sea-level, flooding in the Netherlands forms a vital risk (Van Nes *et al.*, 2001). As a result, FRM continues to be seen as an essentially public task. Insuring flood risks is considered unfeasible and citizen co-production of FRM is pursued as a complementary rather than an alternative flood risk strategy. In Flanders (Belgium), in contrast, the public administration calculated that in some cases actions by citizens (*e.g.* flood protection at the household level) would be more cost-effective than collective protection.

Moreover, these countries face a variety of flood types. In the Netherlands and Belgium the principal threat comes from the sea and large rivers; these types of floods are relatively well-predictable and

feasible to control with defence infrastructure. In France and Poland, beside fluvial (river) floods, they often come as flash floods, due to rapidly accumulating streams resulting from intense precipitation in mountainous areas. This type of flood requires a higher reliance on the flood preparation strategy, in which citizens have a larger role to play compared to flood defence.

Different institutionalisation of flood risk responsibilities

The main explanatory factor for the differences between the countries observed, however, is the variety in how public and private responsibilities are legally divided. This variety partly derives from the hydro-physical differences described above, but also from underlying factors such as deeply embedded views on the role of the state vis-à-vis market and society in a more general sense. Dependent on the degree of institutionalisation of such views, a strong element of path dependency may come into play. Path dependency helps to explain why the impact of driving forces, such as discursive shifts, climate change or Europeanisation, on the relationship between state, market and civil society may be considerably more visible in one country than in another (see Box 5.6).

Box 5.6 Different degrees of institutionalisation of flood risk responsibilities in the STAR-FLOOD countries

In the Netherlands, flooding is considered such a vital threat that it is the state's constitutional duty to provide for the 'habitability of the land' (Van Rijswick & Havekes, 2012). Also in Poland, flood protection activities lie within the formal competences of the state. In England, on the other hand, the authorities don't have statutory but only permissive powers in terms of flood management (Johnson & Priest 2008; Wiering *et al.*, 2015); hence, the ultimate flood risk responsibility lies with the individual. A similar provision has been introduced by law in France: the Act on Civil Security of 2004 states that 'citizens are responsible for their own safety'. However, this stands in contrast to the principle of solidarity, a central feature of the French legal system. Consequently, it appears difficult to invoke the citizen's responsibility in practice. Also in Flanders (Belgium), a discourse on sharing flood risk responsibilities with citizens is prevalent within certain government institutions. Here, the distribution of responsibilities is not clearly defined in law and mainly steered by the informal expectation within the population that the state will protect them from flooding. FRM in this country has for a long time been considered an exclusive governmental responsibility, which explains its low degree of citizen co-production both in the decision-making and implementation of FRM measures.

A similar pattern can be witnessed in the insurance systems. The two STAR-FLOOD countries with the strongest emphasis on private responsibility (England and Sweden) rely most strongly on individuals purchasing insurance against flood damage, while the three countries with the strongest role for the collectivist state place more emphasis on public actors: either private insurance systems are only marginally developed (Poland and the Netherlands) or the privately managed insurance system is subject to strong public coordination and oversight (France).

In Belgium, a two-tier approach is in place. On the one hand, victims of disastrous floods can be compensated by a state-based disaster fund, previously managed by the federal government but recently taken over by the regional governments. On the other hand, private parties are attributed a major role in flood recovery. As of 2 March 2006, the insurance policy against damage caused by floods has been made obligatory and is automatically included in the simple fire risk insurance policy. This implies that private insurance companies have replaced the principal role of the government as compensator.

5.5 Change in multi-level governance

A broadening of actors involved in FRM has not only occurred between different policy actors and domains but also ‘up and down the stairs’. In all the countries, changes in flood risk approach have brought shifts in competences and responsibilities between different governmental levels (see textbox 5.7). What drives these shifts? Which factors determine the balance between the national, regional and local levels?

Questions of scale

When describing and explaining shifts in multi-level governance in different countries, it is important to keep in mind that the scales between these countries differ significantly. In Sweden, for example, the territory of a single municipality is many times that of one in France or Belgium. Because it is a federal country, the regions in Belgium (Flanders and Wallonia) function as the ‘national level’ when it comes to water management, but their scale is of course many times smaller than the national level in France, Poland or even the Netherlands. The difference in geographical size of the investigated countries therefore functions as a first explanatory factor for the differences witnessed. Nonetheless, another set of explanatory factors can be identified.

Box 5.7 Multi-level governance in the STAR-FLOOD countries

In England, France and Poland, shifts between different levels of government are part of a wider decentralisation trend. In the investigated period, actors at municipal or inter-municipal level have gained competences in flood risk management and other policy domains. In Sweden, on the other hand, municipal authorities have always been the principal actors when it comes to flood control and spatial planning. Increasingly, however, support is requested by municipalities from the national government to deal with the challenge of climate adaptation. In Belgium, competences in water management were transferred from the federal to the regional level in 1988, but this should be seen as a recentralisation rather than a decentralisation process: instead of further decentralising towards the provincial and local level, higher government levels have intensified supervision of municipal FRM. In the Netherlands, responsibilities in flood control are strictly divided between the centralised Rijkswaterstaat and decentralised water boards. The Dutch governance structure is thus very stable: local actors only become more involved in cases where traditional defence approaches appear unfeasible.

Driving forces

Discourses

In most of the researched countries, the trend of decentralisation is connected with changing discourses on flood risk management (as discussed earlier). These new approaches have complemented flood defence with a wide range of prevention, mitigation, preparation and recovery strategies. Several of the latter strategies go hand in hand with a more decentralised approach. In Belgium and France, for instance, the discourse on IWRM led to inter-municipal/inter-governmental organisations at a (sub-)basin scale. Since local authorities combine competences of several domains covered by risk-based management, they often provide a more integrated approach compared to the national level. The mitigation strategy, moreover, was seized by (inter-)municipalities in France to increase their political legitimacy. In the Netherlands, water management and especially FRM lies mainly at the regional level; local actors in the field of spatial planning tend to play a larger role in FRM in areas where the traditional flood control approach proves insufficient or unfeasible.

Factors of change

With the discursive shift to IWRM and risk-based approaches as the key driving forces behind the trend towards decentralisation, a number of more specific factors of change influence this trend in the STAR-FLOOD countries in different ways and to a different extent.

The pursuit of subsidiarity

In England, France and Poland, discourses on flood risk management and IWRM are linked with existing decentralisation trends affecting other policy domains as well. Underlying these trends lies the principle of subsidiarity: transferring competences in fields such as FRM to lower governmental levels is assumed to contribute to an implementation better adapted to local circumstances, as well as higher legitimacy (see Box 5.8).

Box 5.8 FRM and general decentralisation trends

After centralising FRM in England between the 1940s and 1990s, British policymakers nowadays strive for a 'new local'. The discourse on localism fits into a wider shift in political ideology. Coming from a highly centralised government structure, the French state initiated a process of decentralisation in 1982; over the past thirty years, successive decentralisation laws have given more power and competences to local authorities in economic development, environment policies, etc. As a result, the centralised culture is nowadays counterbalanced by the increasing power of local authorities, in particular by municipalities united in inter-municipal bodies (Auby *et al.*, 2009). In Poland, the decentralisation process was mainly influenced by the collapse of the communist system in 1989/90, which led to the rebirth of local government and the installation of administrative units at river basin level.

Floods as trigger events

In Poland, the 1997 floods were a trigger to increase attention to crisis management in FRM and to reorganise its structure. Whereas before, the main competence lay with the national army, it is now divided between State Fire Brigades and provincial, county and municipal emergency planning services, and has thus become a 'multi-level' responsibility.

Budget deficits

Next to the motive of better adapting and legitimising flood risk management, decentralisation is in some countries also induced by budget deficits at the national level. In France and to a certain extent the Netherlands, budget cuts within the national administration have accelerated competence transfers towards local authorities. Also in England, the Localism agenda has budgetary consequences favourable to the national level: since the introduction of Partnership Funding in 2012, national grant-in-aid is to be complemented by local funding originating from local authorities, private actors and/or civil society.

Factors of stability

Shifts along the multi-level dimension can be observed in all STAR-FLOOD countries. At the same time, change does not always materialise easily. In England, France and Poland, despite clear tendencies towards decentralisation, the national level remains a dominant actor in flood risk governance, for instance by retaining crucial supervisory powers. In Sweden, the national government is in fact asked by municipalities to become more intensely involved in FRM. In the

Netherlands and Belgium the governance structure is rather stable or even tends to increase centralisation, especially in the field of spatial planning. So what are the factors counteracting or obstructing (further) decentralisation?

The existing legislative framework and distribution of competences

In the Netherlands, flood infrastructure must meet strict legal prescriptions, *i.e.* nationally set safety norms. In general, the Dutch water management arrangement is highly institutionalised and as a result hardly open to substantive shifts in competences (Kaufmann *et al.*, submitted). Also in other countries, the existing legal distribution of flood risk responsibilities and competences forms a barrier to a change in responsibilities at the local level. For instance, the French national government retains important legislative competences with regard to spatial planning, among other matters, which makes it difficult for lower tiers of government to fully wield their powers with regard to FRM.

As in the case of multi-actor governance, a strong degree of institutionalisation brings an element of path dependency. The willingness of the national government to ‘change paths’ and reconsider the relevant legal prescriptions depends in part on its own interests. Not surprisingly, the process of (de)centralisation is often subject to intense power games between local, regional and national levels.

Lacking expertise and budget at local level

Flood risk management is a complex policy domain which requires a comprehensive understanding of possible solutions and their impacts. Local authorities often lack the technical personnel, software and budget to decide on and implement the measures required. In The Netherlands, necessary knowledge and financial resources are available at the decentralized level of water authorities, which is an important reason for the successful decentralized approach. In contrast, in Flanders (Belgium) the majority of municipalities have voluntarily decided to transfer the management of their watercourses to the provincial level because of a lack of resources. In Sweden, the lack of expertise and capacity has been an important reason for the municipalities’ formal and informal requests to the national government to assist them in developing adaptation strategies to climate change.

5.6 Concluding reflections on dynamics in flood risk governance

The central question for this chapter was: ***What factors are responsible for stability and change in arrangements, and what are mechanisms of stability and change?*** We looked at the (changes in) diversity and dominance of FRGAs and strategies, and (changes in) the way flood risk governance is organised through the lens of multi-sector, multi-actor, and multi-level governance.

At the beginning of this chapter (Box 5.1) and in the conceptual model (Figure 1.2) we gave a preliminary overview of the most important explanatory factors. In this concluding section the importance of each of the explanatory factors is discussed in the light of an overall comparison of the six countries.

The role of country characteristics (A)

In table 5.1 we gave a general overview of flood risk governance characteristics in the six investigated countries, and it shows huge differences in both the initial variation and the process of diversification of countries. We discussed how different hydro-physical characteristics, *e.g.* the different flood risks between England and Sweden, partly explain the different levels of diversity in sub-FRGAs. This explanation seems pretty straightforward, but it becomes more complicated as more countries are

included in the comparison. For instance, are there more countries with a high vulnerability to floods, that have comparable levels of urbanisation, and that also have coastal areas, major rivers and pluvial as well as fluvial flooding problems? Do we see the same pattern of diversity of responses in all of these countries? The answer is ambiguous. The Netherlands and Flanders have a quite similar approach and development, while in France, for example, we find a comparable variety of flood risk characteristics and flood problems but very different governance responses. In England, despite the role of different governmental layers, great responsibility is placed in the hands of the individual citizen and local community to take care of flood risk themselves, while in France the general governance characteristics point to a strong role of collectivist, solidarity-based national arrangements. Sometimes the vulnerability of a country together with the nature of flood problems explain responses, but sometimes typical core characteristics of governance in a country ‘overrule’ possible other approaches to flood risks.

To clarify the role of country characteristics in explaining the *process of diversification* of flood risk governance, we need to combine them with additional governance features, such as the nature of legal systems and the use of certain legal instruments. This is an important factor in explaining the possibility to change governance arrangements. In the Netherlands, for example, diversification of arrangements (*e.g.* multi-layered safety) is hampered not only by the high vulnerability and the collective approach to FRM, but also by the strong legal institutionalisation of the defence-oriented approach. In Belgium, in contrast, the institutional system is showing some important changes because of the ‘institutional volatility’ of the country and its “permanent state of institutional reform” (Mees *et al.*, 2015), which could also explain changes in flood risk management. In conclusion, legal path dependencies are crucial to explain changeability of FRGAs in different countries.

The role of driving forces (B)

Tracking the influence of a certain driving force affecting FRGAs and finally changing the set of flood risk management strategies should be accompanied by a nuanced story of chains of effects through ‘battlefields’ of change factors (*e.g.* change agents) and stabilising factors (*e.g.* path dependencies). An overview of the impact of the driving forces can be found in Table 5.2. It is impossible to discuss all these relationships in depth, but in the following section we provide a brief overview for each factor.

Table 5.2 Impact of prominent driving forces on stability and change of flood risk governance arrangements

Most prominent driving forces	Belgium	England	France	The Netherlands	Poland	Sweden
Europeanization	Major change (multi-sector) WFD → agency: nature-based approaches Major change (multi-sector, multi-actor) FD → more emphasis on spatial planning	Change (multi-level) Shock event 2007 + Pitt review + agency interest Stability FD → existing framework is already diverse	Change (multi-level) FD → agency: local initiatives Stability FD → Legitimization of zoning plans	Limited change WFD→supported environmental coalition and integrated water management FD → no major changes due to already stabilised system; support of mapping and risk approach. More diversified safety standards and explicit problem of the non-protected on the agenda	Change (multi-sector) WFD → agency: strengthening position of NGOs FD → less established legislation; mapping but limited impact on spatial planning Stability EU-subsidies for defence works	Change FD → more coherence of local level management - Governance style: local autonomy - Increase of flood risk
Climate change	Medium change Increasing awareness	Minor change Enhances risks - Governance style: neo-liberal Economics: implications for cost-efficiency	Minor stability Reinforces prevention approach - Limited issue on political agenda, low awareness Uncertain impact	Stability Already high flood risk in NL, triggered flood defence mostly	No significant impact Climate change impacts perceived as uncertain and not a priority	Major change (multi-sector) Put flood risk on agenda of other sectors (<i>e.g.</i> spatial planning) & Commission on risk and vulnerability to climate change

Ecological turn/ sustainability	Major change Facilitated by Europeanization (EIA, WFD)	Medium change (multi- sector) Agency: environmental coalition	Medium change (multi- sector) River-widening discourse Agency: broader societal trend	Medium change (multi- sector) - Picked up by environmental coalition - Accelerated by shock event of 1995	Minor change - Agency: Environmental NGOs - Flood event 2010 - Facilitated by Europeanisation	Medium change (multi-sector) - Wider discourse on sustainable development, <i>e.g.</i> in spatial planning - Agency: strong sustainability coalition
Economics	Medium change (multi-sector, multi- level) Socio-hydrological properties: high urbanisation More cost-efficient to implement spatial planning Agency: ministry as proponent of shared responsibilities	Stability Not a new factor; cost- efficiency was already important	Medium change (multi- level) Budget restrictions factor behind decentralisation	Stability Extensive structural dike system, sunk costs Legislation & procedures; improving structural measures most cost-efficient	Stability Agency: competition for budget generates pressure and prevents innovation	Minor stability Municipal budget restrictions Minor change (multi- level) Increasing call for central support

Technology	Medium change (multi-sector) Improved mapping in Wallonia → better integration with spatial planning Agency: policy entrepreneurs	Change (multi-sector) Risk assessment/modelling in spatial planning - Agency: lobby of insurance industry - Shock event 2000 as policy window	Change (multi-sector) Forecasting & alerting → better integration with spatial planning	Stability Agency: Water engineers updated safety standards Minor change (multi-sector) Improvement of mapping, but conflict of interest with economic growth	Change (multi-sector) Hydrological monitoring and warning system facilitates emergency management ; Shock event 1997 as policy window Lack of financial resources to finance structural infrastructure	No data
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Does Europeanisation - in terms of important EU Directives - play a role in the stability and change of FRGAs, and what is the overall effect of this driving force?

We witness a more or less chameleonic effect of the Floods Directive (FD): in some countries it hardly leads to changes, while in others it is strategically used by change agents to discuss shortcomings and stimulate institutional change. The FD has impacted the ways in how countries deal with flood risks in terms of flood communication in general. By way of the creation of different forms of flood risk maps there is increasing knowledge publicly available which affects the awareness of flood risk frequencies and vulnerable areas, both for flood probabilities and consequences. We would expect this to affect flood risk communication. In the Netherlands we do not see an important impact on the dominant approach of water system management, but it facilitated the improvement of communication. Also in France, England, Sweden and Poland there is only limited influence of the FD, albeit for different reasons. In Poland, for example, flood risk mapping is used to try and integrate flood risk into local spatial planning procedures, but in practice this faces resistance from local authorities due to its perceived clash with economic growth. In Belgium, conversely, the FD functions as a leverage to point out shortcomings of the existing FRGA; in particular the role of spatial planning and the perceived 'spatial planning backlog' is under scrutiny.

Does Climate Change play a role in the stability and change of FRGAs, and what is the overall effect of this driving force?

Most countries studied in STAR-FLOOD, with the exception of Sweden, report on a limited to modest impact of climate change on FRGAs. In England climate change is widely discussed, but has not greatly changed flood risk governance as such. It mostly affected the changing weights in cost-benefit analysis because of the costs of climate change. In most countries there certainly is an increasing general awareness of flood risks because of climate change, and often it reinforces the existing paths in flood risk management (*e.g.* France, Netherlands). In Poland climate change is largely neglected, except for rather narrow scientific circles and environmental activists. In Belgium we see a stronger impact as it increases the pressure on already debated aspects of the FRGA. In Sweden, finally, we see that climate change is triggering discussions and actually brought flood risk onto the societal and political agenda, by way of the Commission on Risk and Vulnerability with Regard to Climate Change (Ek *et al.*, 2015).

Does sustainability and the 'ecological turn' play a role in the stability and change of FRGAs, and what is the overall effect of this driving force?

Taking a bird's-eye view of the impact of the discourses on sustainability and the ecological turn (Disco, 2002) on the STAR-FLOOD countries, two observations stand out. Firstly, all countries report an impact of this driving force; in most countries we observe small to modest changes, though the impact was arguably stronger in Belgium and The Netherlands. The changes usually take place in the form of multi-sector shifts: increased emphasis on nature in the floodplain facilitates the inclusion of actors from other sectors into FRM. Secondly, 'the ecological turn' in itself seems insufficient to cause changes; it interacts with other driving forces or is mobilised by change agents. For example, Europeanisation is an important factor working alongside the broader ecological turn: both in Poland, The Netherlands and Belgium EU directives such as the WFD played an important role in stimulating nature-based approaches to flood risk management. In all STAR-FLOOD countries we also witness some form of environmental coalition taking up sustainability discourses and using windows of opportunity (*e.g.* the 2010 floods in Poland) to try and influence the FRGA. In Poland, the

environmental concern is still marginal but has an established significance and is supported by EU directives.

Does the economic environment play a role in the stability and change of FRGAs, and what is the overall effect of this driving force?

With the exception of England, where cost-benefit analysis and economic efficiency has long played an important role in FRM, economic drivers play an increasingly important role in all studied countries. Whether the factor drives mostly stability or change, however, differs per country. In three STAR-FLOOD countries, economic drivers mostly appear to consolidate the existing system. Diversification of the FRGAs is hampered by the high sunk costs of defence infrastructure (the Netherlands), inter-agency competition for budgets (Poland) or resource deficiencies at the local level (Sweden). In two countries, economics are instead a driver for change: in Belgium we see cost-efficiency arguments used to justify multi-sector and multi-level shifts (e.g. towards more emphasis on spatial planning), while in France budget restrictions are an important driver of the decentralisation of FRM towards the (inter)municipal level. As noted before, climate change is often linked to the rising costs of flood risks, and thus plays a role in the diversification of FRM for the financial sustainability of the FRGA.

Does technology play a role in the stability and change of FRGAs, and what is the overall effect of this driving force?

Technology was actually not mentioned in earlier reviews of important external factors in STAR-FLOOD, but was frequently referred to in the country reports and as such surfaced as an important part of the general ‘work environment’ of flood risk management. In brief, we see the role of technology as a ‘supporting force’ as it can strengthen responses geared towards both flood probability (e.g. increasing knowledge of flood vulnerability) as well as flood consequences (e.g. increasingly sophisticated knowledge systems for emergency management). Its direction is therefore, unfortunately, not very distinct. We could say that this explanatory factor is a condition, perhaps even a necessary condition, for further emancipation and use of all strategies.

The role of stabilising and changing factors (C and D)

One of the main aims of this report is to explain stability and change of FRGAs in the six countries. We have explained that core country characteristics give a background for the basic state of affairs in the six countries, and have discussed the potential external driving forces that influence the dynamics of FRGAs. Here, we conclude with some reflections on stability and change.

In all countries there are mechanisms that secure the stability of the overall FRGA. In some countries, especially Poland and The Netherlands, this can be linked to the dominance of a (defence-oriented) sub-arrangement. Path dependencies can be found here because of huge investments in a collective system of dike rings or other flood defence infrastructure, and the increasing returns because of these investments in infrastructure (the sunk costs) that make any outcome of cost-benefit analysis a cause for further enforcement of the flood defence systems. For better or worse, this is path dependency *par excellence*: the stronger the path, the more it reinforces itself. In Poland this path is perhaps a bit less strongly entrenched than in the Netherlands, but there is no sign of strong deviation from the flood defence strategy.

But path dependency is not only hidden in stones or metal; it is also part of the expertise systems or epistemic communities that are developed around the core sets of strategies. In England path

dependencies are more part of the complicated governance arrangements themselves, with specific responsibilities for a variety of actors, resting on public and private parties, on insurance markets and community or individual responsibilities. This might in itself give more potential for change, but a long-term gradual historical development led to this outcome and everybody is used to it. In such a situation, where radical alternatives are unlikely to be pursued, changes will remain incremental.

In Belgium and Sweden we see the most convincing changes in the FRGAs. Sweden has no national FRGA in place yet, so path dependencies are not yet connected to a strongly institutionalised path, but recently flood risks are increasingly part of the political and societal agenda. Where there is barely a path, new pathways can be set out. Belgium can be catalogued as one of the countries in STAR-FLOOD where the organisation of flood risk governance is most dynamic. This is partly due to the fact that the sub-arrangements in place are under continuous pressure: different actors feel they are not as effective as they could be. This fits with the background of continuous state reforms that have contributed to a permanent state of institutional reform. Furthermore, the dynamics in Belgian flood risk governance relate to the presence of change agents aiming for institutional change, *e.g.* by promoting new discourses on integrated water policy or multi-layered water safety. The success of their attempts to inspire change depends partly on the rigidity of the existing arrangements, and partly on the occurrence of 'windows of opportunity' such as the floods of 2002/2003 and 2010 or the European WFD and FD, which create a momentum for new legislation or political support for other flood risk governance approaches.

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Appendix 1. The Structure of the data matrix

A. Flood risk governance strategies (for countries and case studies)

	Instruction	Did you find changes in the relative importance of these strategies in analysed period? (describe in a few sentences)
Prevention of floods (as pro-active planning!)	Current relative importance of flood risk strategies. Importance of a strategy is: high-medium-low (relatively - within the country). If possible add an estimation of an overall importance of strategies in % (where all strategies = 100%)	e.g. prevention (pro-active planning) got support from a new legislation and its importance has grown
Flood Defence		e.g. defence received new resources allowing for major infrastructural programme(s) or projects
Flood Mitigation		e.g. mitigation strategy lost its financial resources and support
Flood Preparation		e.g. the structure and importance of preparation remained stable
Flood Recovery		e.g. a new policy by the central government slightly strengthened recovery strategy

B. FRGA at present (for country and case studies)

	Instruction
Total number of sub-arrangement(s)	e.g. 3
Is the FRGA a "strong" and coherent arrangement or rather a set of independent sub-arrangements?	
Flood risk subarrangement 1	
Main actor(s) and coalitions	1 = Ministry (which one?) 2 = Water / flood risk boards (name in English) 3 = Academics (environmentalists, biologists, hydrologists, policy scientists, other...?) 4 = Consultants 5 = NGOs 6 = Politicians 7 = Other (which one?) 8 = Private companies (included Insurance) 9 = Citizens
Main rules of the game (formal and informal)	
Main power and resource(s)	e.g. main acts
Main discourse(s)	e.g. hydrotechnical with crisis management; nature conservation discourse emerging
Flood risk subarrangement 2	
Main actor(s) and coalitions	as above
Main rules of the game (formal and informal)	
Main power and resource(s)	
Main discourse(s)	
Flood risk subarrangement 3 (if there is one in your country)	
...	
...	

C. Dynamics of FRGA - stability and change (for country and case studies)

	Instruction
Time period taken for analysis	e.g. 1990-2012

Instruction: give a very brief description while answering the question, preferably referring to the overall flood risk governance arrangement. For each question below indicate whether a factor contributes to stability or - to change (or - to both).	Forces of stability (pull factors)	Forces of change (push factors)
Actors and Coalitions		
Are there hegemonous actors influencing FRGA? If so, which actors?	It contributes to stability via...	It contributes to change via...
Are there strong pressures of specific interests? If so, which pressures?	It contributes to stability via...	It contributes to change via...
Is there a strong sense of division of responsibilities among actors?	It contributes to stability via...	It contributes to change via...
Is there criticism on the existing actor-coalitions or the coordination within the arrangement? If so, what are given reasons?	It contributes to stability via...	It contributes to change via...
Power and Resources		
Are there large investments in flood risk infrastructure undertaken in the analysed period?	It contributes to stability via...	It contributes to change via...
Compared with other strategies is there a strong expertise system in flood defence?	It contributes to stability via...	It contributes to change via...
Is there discussion of the system becoming ineffective? In what sense?	It contributes to stability via...	It contributes to change via...
Is there discussion of increasing costs and/or of the system becoming inefficient? In what sense?	It contributes to stability via...	It contributes to change via...
Rules of the Game		
Is the formalisation of rules in law (e.g. strict flood risk standards) an important factor for FRGA?	It contributes to stability via...	It contributes to change via...
Is there a significant implementation gap between formal policies and practical implementation/practice?	It contributes to stability via...	It contributes to change via...
Does the Floods Directive influence course in FRGA?	It contributes to stability via...	It contributes to change via...
Discourses		
Is there a strong historical narrative regarding flood risks? If so, what is emphasized?	It contributes to stability via...	It contributes to change via...
Is there a discourse stressing the government's responsibility in FRGA?	It contributes to stability via...	It contributes to change via...
Are there new discourses/narratives on FRGA?	It contributes to stability via...	It contributes to change via...
General issues		
Are FRGA changes gradual or rapid?		
What are the key milestones - in terms of FRGA shifts (how many shifts)?	Number, which one?	Number, which one?

D. General characteristics (for country and case studies)

	Instruction
GDP per capita in (2012)	
Population density (people / km ²)	Number of inhabitants / km ²
General level of urbanization (in %)	0-100
Urbanization rate predicted (in 2050)	1 = Increasing 2 = Decreasing 3 = Same
Average size of a lowest administration unit-province/local level (number of inhabitants)	
Type of climate	1 = Moderate sea climate 2 = Other (which)
Most frequent type of floods	1 = Fluvial 2 = Tidal 3 = Pluvial 4 = Flash/heavy rainfall

	5 = Other (what?)
Number of floods that brought biggest changes into FRM in analysed period	Number
Predicted impact of climate change on flood occurrence	1 = Increase in flood occurrence 2 = Decrease of flood occurrence 3 = Not evident
Estimated losses in Euro (average of last 1-3 biggest floods)	Provide data from 3 last flood events
Number of transboundary rivers	Number
Flood risk perception (flood risk against other risk) based on EUROBAROMETER	

E. Legal factors (for country and case studies)

	Instruction
What legal system is the basis of your country?	Centralised = 1 Decentralised = 2 Common law = 1 Civil law = 2 Federal = 1 Unitary = 2
Is flood risk policy regulated by constitutional provisions?	Yes = 1; No = 2
Number of administrative levels in FRM	Yes = 1; No = 2
Which formal procedural norms are embedded and structure implementation of FR policies (several answers are possible) in your country?	Norms formalizing planning procedures = 1 Norms requiring environmental impact or water assessments = 2 Water test = 3 Norms regarding public participation = 4 Legal protection and legal standing of stakeholders = 5 Other = 6 (if other, provide information about the procedure)
Are there soft law instruments (for instance: river contracts, water covenants, other non-binding agreements)?	Yes = 1 (if yes - provide them); No = 2
Do you have different categories of watercourses in your country?	Yes = 1; No = 2 If the answer above is 'yes' answer for those questions: - Who is responsible for doing what in each category? - Is there a different owner for each class of rivers? - Who is responsible for which classes of river?
Does your country have standards for flood defence structures/legal safety standards?	
Defence infrastructure ownership	Public (administrative or state owned) = 1 Mixed = 2 Private = 3
Property rights clarity of defence infrastructure	Clear and consistent property rights system = 1 Not clear property rights system = 2
Is there a specific law on flood risk management or is it part of other laws?	One specific law on flood risk management = 1 Flood risk management within several laws = 2
How does the legal framework in your country induce cooperation between relevant actors in international river basin districts (shared waters with other Member States)?	Yes = 1; No = 2
Water issues regulated by one piece of legislation?	One act = 1 Several acts = 2
List of pieces of legislation relevant to water issues	Provide the list of legislation
Which instruments are used to cooperate in international river basin districts?	Yes - 1 (if so provide instruments, e.g. the European legislative framework, international cooperation forms, bilateral

	cooperation forms)?; No = 2
Implementing legal frameworks for the Water Framework Directive and the Floods Directive is integrated into one legal framework, or are they being implemented separately?	1 = Integrated into one legal framework (specify) 2 = Implemented separately (specify)
Relation of spatial planning instruments related to other instruments related to flood risk management. Are they legally independent?	Yes = 1; No = 2
Which legal spatial planning instruments are available in relation to flood risk management?	Clarify your answer with explanation
Are there some technical regulations (e.g. for building in flood prone areas)?	Yes = 1; No = 2
How is the flood defence funded?	Private = 1 Public (provide specification about taxes or fees) = 2 Private-public = 3
Is civil protection integrated with flood management?	Yes = 1; No = 2
Is there a legal obligation for local authorities for training in case of emergency/evacuation purposes?	Yes = 1; No = 2
Are flood risk maps used in the context of emergency management related to flood risk maps for prevention?	Yes = 1; No = 2
Who is responsible for evacuation?	Provide name of institution (or administrative level) responsible
Are there any legal requirements to secure funding in case an emergency occurs?	Yes = 1; No = 2
Insurance policy system	Obligatory = 1 Voluntary = 2 Partially subsidized (funded) by state = 3
Type of actors obliged to be insured	Farmers = 1 Private sector = 2 Public infrastructure (facilities) = 3 None = 4 Other = 5 (provide information about which actors)
Type of insurance	Package = 1 Dedicated to floods = 2
Does the legal framework promote a link between the ex-ante compensation and prevention?	Yes = 1; No = 2
Damages compensation	i) Does the law specifically address loss caused by measures against flood? Yes = 1; No = 2 ii) Does the law define who has to pay the compensation? Yes = 1; No = 2 iii) What are the criteria providing compensation for the damage? (explain)
Do breaches in obligation for flood risk management result in general civil liability?	Yes = 1; No = 2
Assessment of public participation procedures (concerning flood risk management)	
Has the Floods Directive been implemented in a schedule?	Yes = 1; No = 2
Do the nature protection requirements restrict taking flood risk measures?	Yes = 1; No = 2
What are the mechanisms for stakeholder to make decision-makers accountable?	
Is the access to justice properly provided in relation to flood risk management?	Yes = 1; No = 2

F. Influence of agency (for country and case studies)

...	Instruction
Did the most important actors involved in FRM change in the analysed time?	Yes = 1; No = 2
Using information on coalitions, which resources are utilized by the coalitions (1 formal legal authority; 2 public opinion; 3 access to information; 4 ability to mobilize support; 5 financial resources; 6 skilful leadership)?	e.g. First coalition (hydrotechnicians) uses mainly formal legal authority (1), financial resources (5) and mobilizable troops (4) e.g. Second coalition (environmentalists) use mainly skilful leadership (6), mobilizable troops (4) and public opinion (2) e.g. Third coalition e.g. Fourth coalition
What examples of learning within FRGA(s) have you been able to observe in your country according to each level of governance? (max 200 words)	e.g. Crisis management on municipality level began to incorporate local networks into their actions e.g. effectiveness of expropriation was low and delayed - new legal acts provided to expropriate people
What examples of negotiation within FRGA(s) have you been able to observe in your country according to each level of governance? (max 200 words)	e.g. nature conservation arguments raised by NGOs started to be taken into account by dominant, hydrotechnical actors
What role have/had policy entrepreneurs for the general performance of FRGA?	e.g. policy entrepreneurs concept - people taking a risk to create new policy ventures, to gain advantage over an alternative
What role have/had power elites for the general performance of FRGA?	e.g. by power elites concept we mean relatively small group of people who tend to dominate policymaking
What role have/had policy champions for the general performance of FRGA?	e.g. by policy champions we mean forerunners of actions in the policy fields (proponents of innovation etc.)

G. Influence of events (for country and case studies)

...	Instruction		
Has any important shock event occurred in the analysed time?	Yes = 1; No = 2		
How many shock events can be distinguished since baseline year used for the analysis ?	First shock event (with year it occurred, and a few words description)	Second shock event (with year it occurred, and a few words description)	...
Type of shock event	1 = Ecological / environmental 2 = Hydrological 3 = Legal 4 = Political 5 = Economic 6 = Administrative 7 = Public opinion 8 = Other (what)?	1 = Ecological / environmental 2 = Hydrological 3 = Legal 4 = Political 5 = Economic 6 = Administrative 7 = Public opinion 8 = Other (what)?	...
Origins of shock event	1 = Endogenous 2 = Exogenous	1 = Endogenous 2 = Exogenous	...
Duration of shock event	1 = Less than a month 2 = Month to six months 3 = More than six months	1 = Less than a month 2 = Month to six months 3 = More than six months	...
No of people affected by shock events	provide the number of people affected (if relevant)	provide the number of people affected (if relevant)	...
	1 = new legislation in FRM (what legislation?) 2 = new legislation outside FRM with an impact on FRM (provide information about this legislation) 3 = Change in existing legislation in FRM	1 = new legislation in FRM (what legislation?) 2 = new legislation outside FRM with an impact on FRM (provide information about this legislation) 3 = Change in existing legislation in FRM	...

Dynamics in rules in FRM	<p>(e.g. different law merged into one, improvement in formal instruments)</p> <p>4 = New interpretation of existing rules appeared</p> <p>5 = New informal norms (e.g. cultural, societal) appeared (explain what norms)</p> <p>6 = Change in previously existed norms (e.g. common practice legally institutionalised)</p> <p>7 = No significant change</p>	<p>(e.g. different law merged into one, improvement in formal instruments)</p> <p>4 = New interpretation of existing rules appeared</p> <p>5 = New informal norms (e.g. cultural, societal) appeared (explain what norms)</p> <p>6 = Change in previously existed norms (e.g. common practice legally institutionalised)</p> <p>7 = No significant change</p>	
Dynamics in actors in FRM	<p>1 = Change in actor(s) involved in FRM (e.g. administrative body, consultative body, professional fora)</p> <p>2 = Additional actor(s) from outside FRM got involved into FRM</p> <p>3 = New forms of cooperation between actors in FRM was established (e.g. new project launched)</p> <p>4 = Additional competences for previously established actor(s) within FRM were given</p> <p>5 = No significant change in actors dimension</p>	<p>1 = Change in actor(s) involved in FRM (e.g. administrative body, consultative body, professional fora)</p> <p>2 = Additional actor(s) from outside FRM got involved into FRM</p> <p>3 = New forms of cooperation between actors in FRM was established (e.g. new project launched)</p> <p>4 = Additional competences for previously established actor(s) within FRM were given</p> <p>5 = No significant change in actors dimension</p>	...
Dynamics in resources in FRM	<p>1 = Change (decrease/increase) in amount of financial resources (If so, provide information where they appeared or disappeared)</p> <p>2 = Change in origin of resources (e.g. diversification of sources of financing)</p> <p>3 = Change in using previously existing resources (e.g. shift of financial support from one matter to another) If so, provide explanation what was this change about</p> <p>4 = Other (if so, what dynamics have you been able to diagnose in your country?)</p>	<p>1 = Change (decrease/increase) in amount of financial resources (If so, provide information where they appeared or disappeared)</p> <p>2 = Change in origin of resources (e.g. diversification of sources of financing)</p> <p>3 = Change in using previously existing resources (e.g. shift of financial support from one matter to another) If so, provide explanation what was this change about</p> <p>4 = Other (if so, what dynamics have you been able to diagnose in your country?)</p>	...
	<p>1 = new type of resources gained significance (e.g. new technology, new expertise)</p> <p>2 = Change in previously existing resources (e.g. more space for the river provided, technological improvement etc.) If so, provide information which resources and where they gained or lost significance</p> <p>3 = Other (if so, what dynamics have you been able to diagnose in your country?)</p>	<p>1 = new type of resources gained significance (e.g. new technology, new expertise)</p> <p>2 = Change in previously existing resources (e.g. more space for the river provided, technological improvement etc.) If so, provide information which resources and where they gained or lost significance</p> <p>3 = Other (if so, what dynamics have you been able to diagnose in your country?)</p>	...
Dynamics in discourses in FRM	<p>1 = new discourse came into sight (if so, provide information about this discourse)</p> <p>2 = Change in previously existing discourses (e.g. previously existing discourse gained momentum, reinterpretation of previously dominant discourse proposed) If so, please explain why</p> <p>3 = Other (if so, please explain what dynamics)</p>	<p>1 = new discourse came into sight (if so, provide information about this discourse)</p> <p>2 = Change in previously existing discourses (e.g. previously existing discourse gained momentum, reinterpretation of previously dominant discourse proposed) If so, please explain why</p> <p>3 = Other (if so, please explain what dynamics)</p>	...
	1 = Change in FRM from particular interests to broader one in spatial sense (i.e. to river	1 = Change in FRM from particular interests to broader one in spatial sense (i.e. to river	...

(Spatiality) Did shock event eventually led to... (one of the issues mentioned in the columns on the right)?	basin management, transboundary management) 2 = Change in FRM from based on wider spatial perspective (<i>i.e.</i> transboundary management) to a local interests approach) 3 = No significant change can be observed	basin management, transboundary management) 2 = Change in FRM from based on wider spatial perspective (<i>i.e.</i> transboundary management) to a local interests approach) 3 = No significant change can be observed	
(Public, stakeholder involvement) Effects of focusing event have eventually led to... (one of the issues mentioned in the columns on the right)?	1 = Change from few interests groups to greater number of stakeholders involved 2 = Change from more stakeholders involved to less stakeholders involved 3 = No significant change can be observed	1 = Change from few interests groups to greater number of stakeholders involved 2 = Change from more stakeholders involved to less stakeholders involved 3 = No significant change can be observed	...

Appendix 2. Comparative legal methodology

There are a number of legal analytical methods that were employed in this research; namely drawing from *historic*, *positive*, *normative* and *comparative* legal analysis. These are summarised in the table below. Although this table presents these legal analytical methods as distinct, in practice these approaches are related. For instance, historical analysis is required for positive theories; in turn, positive analysis is needed in order to provide some form of normative evaluation. For STAR-FLOOD, we required a degree of all perspectives in order to sufficiently analyse, explain and evaluate the legal rules shaping FRGAs.

Analytical method	Description	Objectives
Historical analysis	This method requires a baseline date (or ‘reference point’). Essentially, this method documents and analyses <i>how</i> the law has evolved. Combined with policy analysis, this will facilitate insights into <i>why</i> the law has changed.	<ul style="list-style-type: none"> ▪ To map out the legal landscape of FRM ▪ To identify shifts in governance arrangements (<i>i.e.</i> the rules, resources and actors) ▪ To facilitate insights into why the legislation has changed
Positive legal analysis	<p>Positive law concerns the current legal framework (<i>i.e.</i> what the law is, why it is this way and how the law affects the world). This analysis is primarily <i>fact-orientated</i>. The study of positive law will be used to examine the legal frameworks governing FRM. There are three types of positive theories we will draw from;</p> <ul style="list-style-type: none"> - Doctrinal theory: This documents the content of a specific area of law - Explanatory theory: This seeks to explain why the law is shaped in a particular way - Effect theory: This examines the consequences and implications of the law 	<ul style="list-style-type: none"> ▪ To map out the legal landscape of FRM ▪ To explain why the law is shaped in a particular way ▪ To examine the consequences and implications of the law
Normative legal analysis	<p>Normative law is essentially concerned with what the law ought to be (<i>i.e.</i> what is regarded as best, right or justifiable). This type of analysis is <i>value-orientated</i> and inherently evaluative. Thus it is relevant to the STAR-FLOOD project in terms of the evaluation of FRGAs; as well as informing design principles for strengthening future governance frameworks. There are three types of normative theories we will draw from;</p> <ul style="list-style-type: none"> - Ideal v non-ideal theory: This examines the 	<ul style="list-style-type: none"> ▪ To evaluate the law in terms of its desirability ▪ To inform suggestions for improving the law ▪ To evaluate the law in terms of how it is justified

Analytical method	Description	Objectives
	<p>‘ideals’ and considers the best legal rules in a world with or without constraints (<i>e.g.</i> political feasibility).</p> <ul style="list-style-type: none"> - Justificatory theory: This examines how the law and status quo is justified. - Critical theory: This critiques the existing legal doctrine 	
Comparative legal analysis	<p>Positive legal analysis will form the basis for comparative study. This is a crucial objective for WP4. Here, we adopt a <i>functionalist perspective</i>; based on the premise that law addressing the same problem can be compared. Analysis will thus be led by a particular issue (rather than some legal concept).</p>	<ul style="list-style-type: none"> ▪ To examine the implementation of international and European legislation in consortium countries ▪ To help identify best practices

